The MINING CONGRESS JOURNAL

ANNUAL METALS NUMBER

The Economic Importance of Copper

Some Thoughts on Silver and the Orient

Potash—Past, Present and Future

Developing the American Tungsten Industry

Trends and Opportunities in Gold Ore Treatment

Expansion of Centralized Milling and of Tailing Retreatment Operations in the Tri-State Zinc-Lead Mining District

Accident Experience and Cost in Wyoming Coal Mines

Mining Anthracite Without Roof-Fall Accidents

Contributors

Dr. H. Foster Bain, W. Mont Ferry, Horace M. Albright, William Loach, A. W. Allen, Frank J. Cuddeback, Wm. F. Netzeband, D. J. Parker, R. D. Currie

SEPTEMBER
1934

METALS CONVENTION and EXPOSITION

NEW BETHLEHEM TIE

wins prompt acceptance

THE NEW Bethlehem No. 2 Steel Mine Tie is rapidly winning acceptance among mine operators who appreciate the importance of low-cost track-laying. The tie is painted red for identification.

While this new tie is more than twice as strong as the old type, it weighs only 3 per cent more. Its light weight makes the new Bethlehem No. 2 the ideal tie for room track.

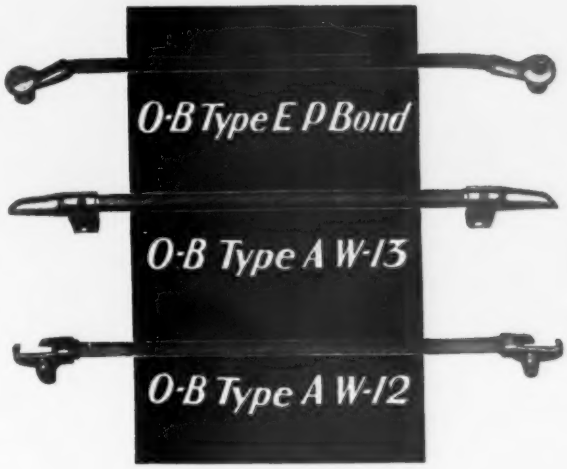
When operations are transferred from room to room the miners themselves can easily and quickly remove and re-lay track built with Bethlehem No. 2 Ties. There are no delays due to waiting for the track gang. No time lost, while production lags. The only tool a miner needs to attach rails to the new red tie is a hammer.

Are you pondering ways and means to increase the production of your mine? Consider how good track improves haulage schedules and increases output per man per shift, and how track that is quickly laid increases efficiency where efficiency is needed most—at the working face.

No wonder so many low-cost producers are adopting the new red Bethlehem No. 2 Steel Ties for room track! Write to our nearest district office for complete information.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

Don't Let POWER LOSS Steal Hard Won Profits!



Top—The Type-EP continues to be the favorite where mechanically applied bonds are preferred.

Center—If steel arc-welding is your standard, you can use the AW-13 to advantage.

Bottom—It is a simple matter to get a strong, homogeneous weld with the AW-12.

ALREADY drills, undercutters and saws are biting into the face, locomotives are rumbling up and down haulageways; the winter's supply of coal is on its way out. Before long the strain on all productive facilities will be at its peak. Will track circuits insure an adequate and continuous supply of power to electrical equipment? Or will the strain necessitate costly delays and penalties which might have been avoided with a little forethought?

Why not take the time now to check joint and cross bonding? Replacement of faulty bonds will prevent serious breakdowns later, when every minute is at a premium. And besides insuring an uninterrupted flow of power, good bonds and good bonding will keep power loss from eating away a substantial portion of hard won profits.

1704-M

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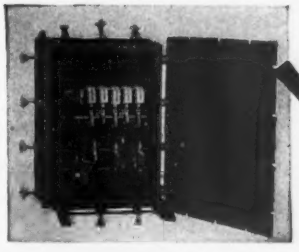
these G-E Money-Saving Equipments



CONTROL—If you are using manually operated starters, you will find it profitable to investigate the complete line of G-E automatic controls. They're strong, dependable, and long-lived. Their contactors have been tested for thousands of operations. Their thermal over-load relays provide positive protection for your motors.

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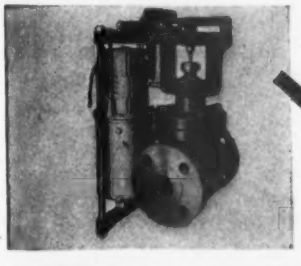

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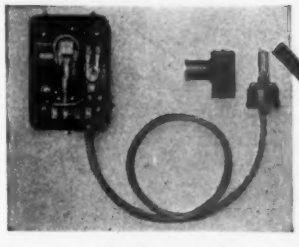

PHOTOELECTRIC CONTROL—the electric eye that, by a beam of light, can be used to control accurately such operations as weighing, counting, sorting, lighting, etc., without human or mechanical errors. For example: this equipment is now used to proportion, automatically, cement and aggregate in ready-mixed-concrete plants. You have many applications for this labor-saving device. Don't fail to check it.

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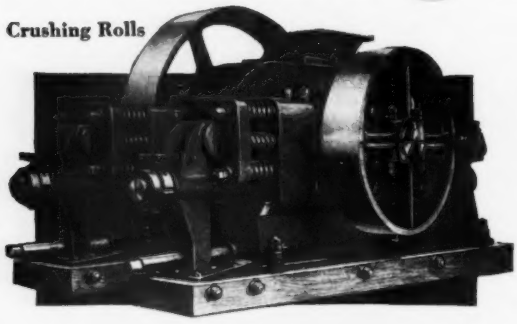
011-27

GENERAL ELECTRIC

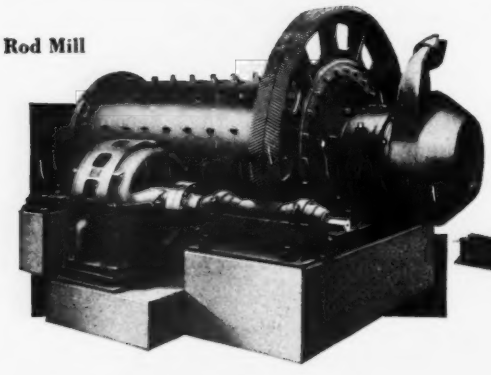
Crushing and Grinding

Crushing Rolls



A complete engineering and manufacturing oranization enables Allis-Chalmers to completely equip your crushing or grinding plant. Standard gyratory crushers are built with feed openings up to 60 inches, jaw crushers up to 84 by 66 inches. Newhouse reduction crushers give high production at high efficiency. Crushing rolls are built for many ores and ball and rod mills for every grinding condition. Positive action vibrating screens are built in many sizes.

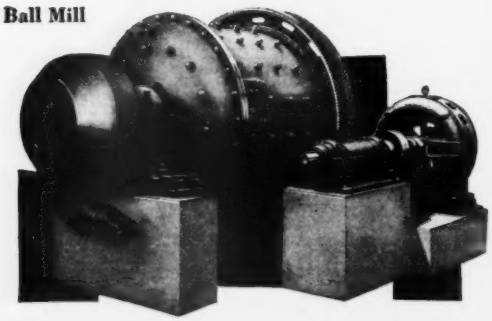
Rod Mill

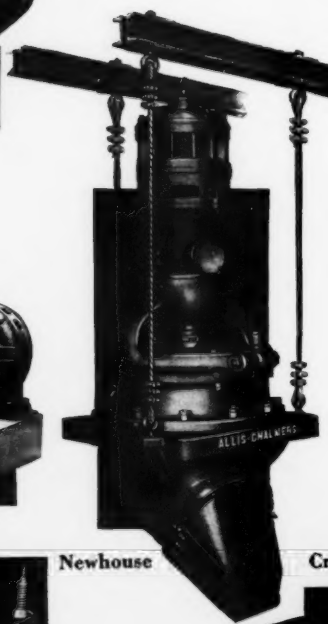


Products for the Mining Industry

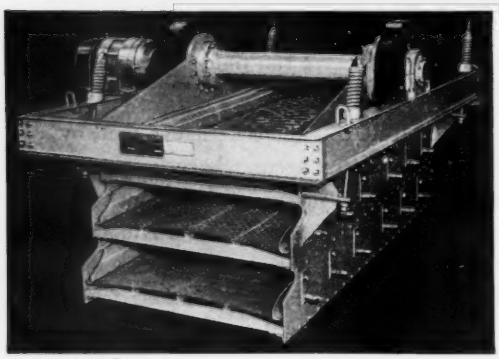
Primary and Secondary Crushers
Crushing Rolls
Screens and Sizers
Ball and Rod Mills
Electric Mine Hoists
Sampling Machinery
Grinding Media
Casting Machines
Copper Converters
Jigs and Classifiers
Elevators and Conveyors
Electric Motors
Texrope Drives
Centrifugal Pumps
Compressors and Blowers

Ball Mill

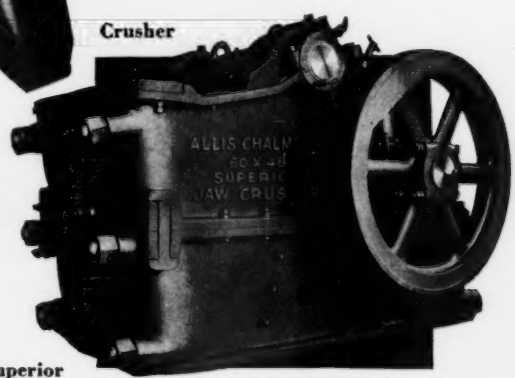




Newhouse Crusher



Vibrating Screen



Superior Jaw Crusher

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

IT CAN'T RUST THROUGH IF THE BASE IS BRASS

Figure 1

• Old Mother Nature is a hard taskmaster on metals that will rust. Rain, snow, fog and sunshine will cause ferrous metals to rust and pit even though they may have a coat of chromium. As the United States Bureau of Standards aptly puts it:

• "All the common ferrous...material will rust on exposure to air and moisture or water which has not been completely freed of its dissolved air. Under different conditions some . . . will rust less than others but all will rust."

• Here are two unretouched photographs that well illustrate this fact. They are both chromium plated automobile lamp supports. They were exposed to the outdoor air in Florida on May 18, 1933. Figure 1 is chromium on a base of Brass. Figure 2 is on a base of ferrous metal. Fifteen weeks after they were exposed to the test the support on a base of a ferrous metal had rusted and pitted as the illustration shows. The other on a base of Brass did not lose its beauty and appearance of newness.

• Copper and Brass require less polishing, are easy to form and require fewer operations preparatory to plating.

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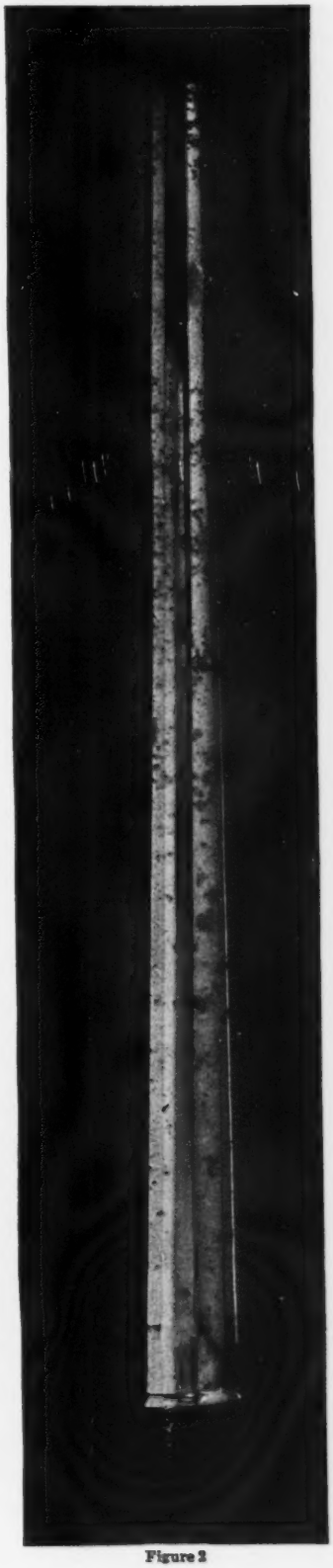

Figure 2

Outlasts any other Gathering Locomotive Cable

THE tough woven jacket of Duracord *stays on* . . . it's cemented to the insulation. That's the big reason why Anaconda Duracord is the longest-life cable you can buy for gathering locomotive use. Service records prove it.

Duracord is one of the 81 wire and cable products in the *complete* Anaconda line. Others are trolley wire, magnet wire, flexible cords, weather-proof wire, varnished cambric cable, power cable, armored cable, mining machine cable . . . wires and cables for every mining need.

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DRY PIGMENTS (Cont'd)

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Red Lead
Sublimed White Lead
Super Sublimed White Lead
Litharge
Sublimed Litharge
Lead Oxides
Zinc Oxides
Lithopone

FOR PAINTING

White Lead in Oil

FOR PAINTING (Cont'd)

Sublimed Blue Lead in Oil
Red Lead in Oil
Flatting Oil

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- Few materials in the crude state are available to industry in the same high degree of purity as our product. It is 99½% pure sulphur and free from arsenic and selenium.

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The Square Deal

THE New Deal must be a Square Deal if it commands the final approval of the American people. It must relinquish its apparent motto that the end justifies the means. No end, no matter how meritorious in itself, can be made to justify a breaking down of personal or property rights.

As an emergency measure, the New Deal asked for approval. Having received that emergency approval it now proposes to make itself permanent. It can only become permanent by reinstating the successful business principles of the past.

It cannot hope to win the enduring approval of the American people by creating government competition to established business enterprises; nor by a destruction of property rights by a redistribution of wealth; nor by using borrowed money to pay doles under the guise of wages higher than can be paid by business enterprises needing such help, but unable to pay the higher wage.

In short, a return to prosperity must be predicated on individual initiative and the ability of each separate unit of business to work out its own success without undue governmental interference.

We are trying to get out of our national muddle by increasing our indebtedness by billions, by limiting production, by increasing prices and by meeting the requirements of the needy through increased taxation.

The headway thus far made seems to have been at an unjustifiable cost. The most radical change thus far effected has been the installation of organized labor as a substantial, if not a controlling force in management.

In spite of foolocracy every business is carried on for profit. Investment is never made except for profit. Capital can hardly be induced to engage in undertakings in which management is more concerned in outgo than it is in income. With the outgo—wages—in the partial or complete control of organized labor, competition in the field of efficiency will slacken, the waste of half-earned wages will absorb the earnings and such enterprises as succeed will, through increased prices, put upon the consumer the additional burden of management incompetency.

In the past the consumer has been protected against unfair prices by the fact that any field showing unusual profit was quickly invaded by individual enterprise always on the lookout for profitable fields of operation. Monopoly could not continue to burden consumers except it controlled the sole source of supply. Even fields of monopolistic supply control were invaded by the invention of substitutes.

Experienced business judgment did not favor the National Industrial Recovery Act. After enactment it was supported as a necessary choice of two evils. The great business machine as previously constituted was the result of the experience of millions of trained men each contributing the success of his own business to the sum of business success. This constituted the business life of the nation.

This business organization became disorganized largely because of the government's failure in the one field in which it was constitutionally responsible, viz., "to coin money and regulate the value thereof." Business was helpless to right itself because of government interference through its anti-trust laws. To meet this situation the National Recovery Administration set aside the anti-trust laws and required business to do many things previously unlawful.

In the past the great business machine grew with world requirements to meet the needs of every individual. Whether it was spice from India or milk from adjoining territory each in just the right amount to meet metropolitan needs, was available with uncanny accuracy. In another day this subject was discussed by Herbert Spencer as follows:

> *"If the needs of London were to be provided by a carefully devised organization, it is incredible that the supply should be adapted to the demand with such nicety as it is now, where there is no conscious organization whatever. In short, the affairs of life are very much better conducted by those natural organizations which grow up without intent to meet the needs of the people than by manufactured organizations which clumsily and stupidly endeavor, at great cost and by compulsory methods, to supply what they imagine to be the needs of the people."*

When the National Recovery Administration undertook to replace these marvelously complicated devices through newly developed plans of a few individuals, mostly experienced in the various operations; when a few men assumed to do what the brains of thousands of trained individuals had been taxed to accomplish, it undertook an impossibility.

The New Deal must be a square deal or become the most collossal failure in history.

The Square Deal will recognize the right of personal liberty and private property.

The Square Deal will protect the legally acquired rights of every citizen and particularly the right of every citizen to carry on any chosen legitimate business.

We hazard the prediction that business will never become normally prosperous until the Square Deal has taken the place of the New Deal and until business is relieved from the meddlesome interference of theorists who do not know.

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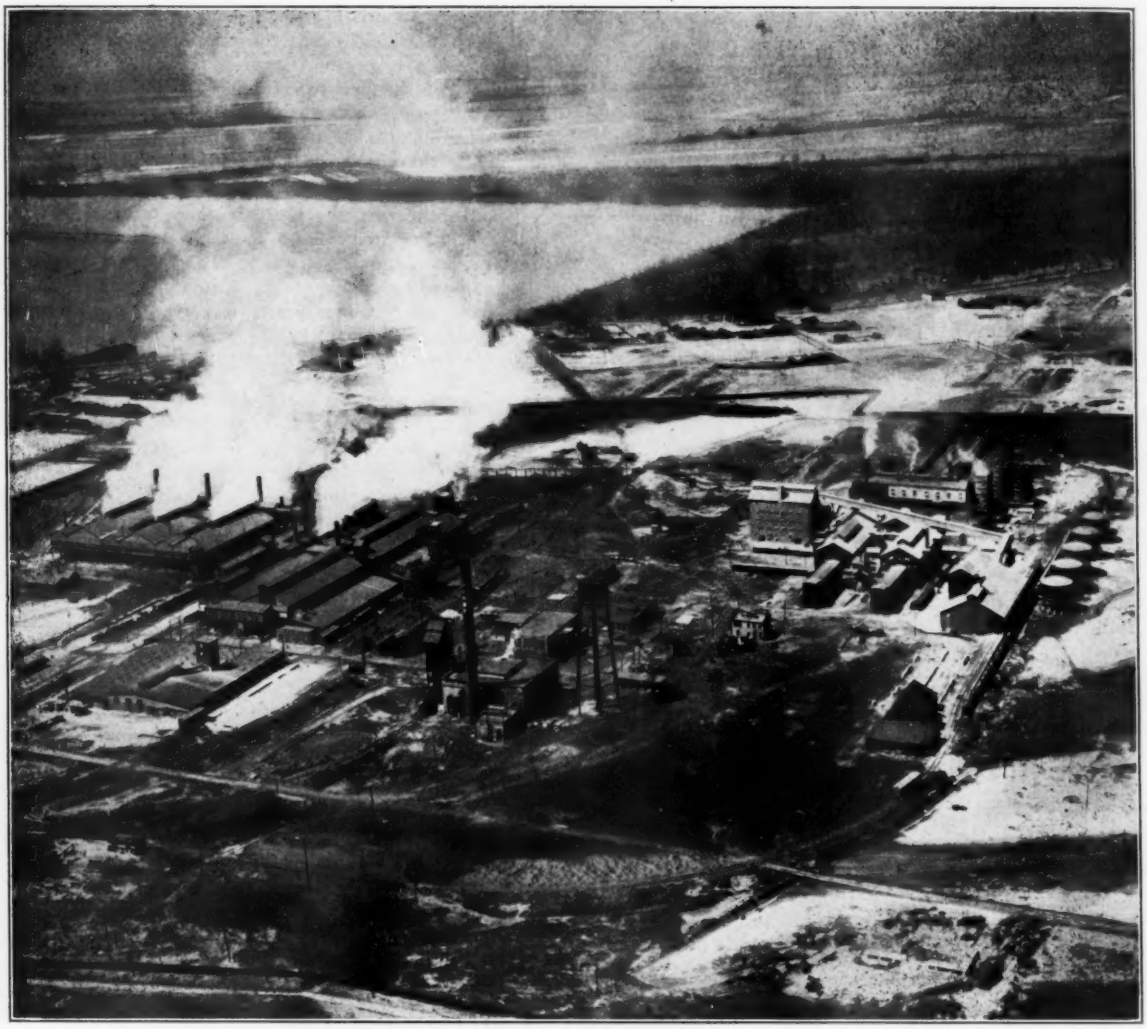

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The
MINING CONGRESS JOURNAL

VOLUME 20
NUMBER 9

SEPTEMBER
1934

A Journal for the entire mining industry published by The American Mining Congress

Western Meeting

THE "West" is familiarly known as the mining center of this country. Practically every state west of the Mississippi River owes its prosperity to the mines, for in practically all of these states mining is a major industry. Therefore, the prosperity of the mines is of vital importance to that vast area known as the West, as well as to the rest of the United States which is largely dependent upon the products of these mines.

Mining has been at low ebb for the past three years. The great copper mines of Arizona, Montana, Utah and New Mexico have been practically closed down. The lead-zinc fields have suffered. And until recently, even gold and silver were in the doldrums. The President's action in relation to these metals has started renewed activity in California, Colorado, Utah and the Coeur d'Alene. The codes have given new heart to the copper mines, and all mining is on the upgrade.

These industries, employing thousands of men, are intricately involved in the problems presented by the plans and demands of the "New Deal." They are seriously involved in the matters of bargaining tariffs; of provisions of the revenue bill; in proposals for unemployment insurance and workmen's compensation; in the National Labor Board; and in the codes under which they are attempting to function.

Therefore, at this time, the annual meeting of the Western Division of The American Mining Congress, at San Francisco in September, is of tremendous importance. Mining men from every metal producing district will attend the meeting. The program is an interesting one, participated in by men who are leaders in their industries. The exposition of mining machinery and supplies completes the picture, which will attempt to indicate the economic importance of mining to the nation. The program appears in this issue. It behooves every mining man who can do so to attend this meeting and assist in developing recommendations and a platform upon which all may unite in the solving of their common problems, whose name is legion.

Mistakes vs. Experiment

THE United States has a long record of marvelous performance. It was and is a rich country—rich in natural resources and in native brains. The policy of our forefathers was to give those brains a chance with the natural resources. Brains went further. They invented substitutes for nature's products and thereby increased our international standing. Up to the year 1929 we were (if we still are not) the envy of the world. Our "captains of industry" led the way to the highest standard of living known in the world today. Perhaps we have emphasized creature comforts too much and cultural advantages too little—but, nevertheless, older and supposedly wiser nations watched us with awe and envied our progress and genius.

Natural resources, be they water power, minerals, or crops, do not become national assets without the magical application of what is commonly recognized as brains. The great captains of industry who undertook to develop the United States deserve all credit. Building railroads, opening great ore deposits, spanning the country with a power system that brought relief from human drudgery, all required genius. The men responsible were leaders, thinkers, doers. They were farsighted but they were not infallible. They made mistakes. They recognized them and did not repeat them. Today we are faced with an era that advances the program of experimentation. The United States, its great industries, its capitalists, its white collar employes, its workers, are all guinea-pigs, into whom is to be injected the virus of a new plan. Blindly we strive for the millenium. Because the industrial leaders guessed wrong once . . . because these men have been unable to quickly readjust our industries to a world-wide depression, we hear that their method is ALL wrong and that we must "try something—anything—new."

Since when did American brains become incompetent? And American blood turn to water? Who ARE we that we need "Priests to tell us what to think; Kings to tell us what to do?" Where is all that vaunted independence, and ability, and self-reliance?

The theory that has actuated us during the past few years of "any port in a storm" is not a sound theory. Let us return to a rational state and permit the men of ability to lead us out of our industrial, political and moral morass.

Just Due

THE United States Bureau of Mines is a comparatively new Government bureau. It was established after a long, hard fight, in which a forceful campaign was made to enlist the Government's aid, among other important things, in diminishing the alarming accident rates. For approximately 25 years this bureau has served the mining industry with more—or less—efficiency. Whatever else may be said of it, its work in behalf of mine safety has produced splendid results.

The bureau, for the first time in its existence has been subjected to political change. A new director has been appointed. No other technical bureau has been subjected to such a change and certainly not in the manner of the present transfer. It helps considerably that the man appointed by the President is well qualified for the job and will bring to the office a tremendous wealth of experience in the mining world, a great deal of technical knowledge and training, and admitted and demonstrated organizing ability.

We have intermittently for the past several years urged mining men to forget their small grievances against the bureau and join hands in a real campaign to rehabilitate it and to compel the Congress of the United States to award it sufficient funds to carry on the many projects of value to mining that it is so well qualified to undertake. Now seems to be a particularly auspicious time for united action, and we urge every mining man interested in the future of the bureau to join with The American Mining Congress and its committees in a campaign of education and publicity.

One pertinent fact may not be amiss: In a normal year of production the mining industry paid in Federal taxes $161,136,456. Its bureau received in direct technical aid from the Government, in that year, $1,875,010. The highest appropriation ever received was slightly more than $3,000,000. Agriculture in the same period paid $35,152,152 in Federal taxes and received in direct aid from the Government more than $124,774,441.

We realize that all industry cannot receive four or five times as much as it pays into Government, but there should be some line which would not penalize the stronger unit too heavily.

There are many things that the bureau, and the bureau alone, can do for all the mining industry. Its safety and health work, its statistics, its research, its experiment stations—to mention but a few things—should be kept at a maximum of efficiency. It is good business for the Government; it is good business for the mining industry. Budgets are now in the making. Recommendations will be made shortly to the Secretary of the Interior, Mr. Ickes. The mining industry should make itself heard, felt and seen. In all its ramifications the industry represents better than 25,000,000 people. It employs thousands of workers. It has a huge annual payroll. It pays tremendous state and Federal taxes. Thousands of communities are wholly or in part dependent upon the mines. And additional thousands of industries and individuals are dependent upon the industries emanating from the products of the mines. The American Mining Congress is sponsoring a worthy movement, and all mining men should climb aboard and help.

New Heights in Labor Disputes

●

NEW heights are daily being recorded in our record of labor disputes. From a total of 808 strikes in 1932, we have reached the alarming all-time record of 4,277 in the year ending July 1, 1934. The previous "high" was in 1919 when we developed 3,630 disputes. Not all of the disputes, of course, end in strikes. According to the National Labor Board approximately 1,100,000 workers have been involved in strikes under the Blue Eagle.

It is fairly obvious as to why we are so beset with strikes at this time. In spite of assurance from General Johnson and others that Codes of Fair Competition would eliminate strikes, they have increased. No matter what label is given the strike, it usually has for its purpose the interpretation of Section 7(a) of the NIRA. Workers have one idea of the meaning of that section. Employers have another meaning. The Labor Board says that more than half of all the strikes may be directly attributed to this controversy.

No one seems to be winning the argument. Evidence would indicate, however, that labor has a slight edge, in that disputes settled in their favor increased from 27 to 31 per cent in 1933. The only sound recommendation as to a way out comes from David Lawrence, who demands that union labor itself accept the Blue Eagle and work under a Code of Fair Competition. Certainly until union labor shall be made responsible for its acts, until it shall accept the responsibility it has so definitely avoided, there must be controversy over Section 7(a). An American Federation of Labor, backed and policed by the Government is anything but American and is something that the people as a whole will repudiate when once it is understood.

Our Tax Burdens

●

ESTIMATES from reliable sources indicate that the total tax collected by Government—Federal, State and local—for the year 1934 will approximate $9,000,000,000, which would be about 20 percent of our national income. This does not, however, tell the whole story, because the expenditures of Government are considerably larger than annual tax collections, and the deficits so occasioned must be taken care of by borrowing, which sometime, somewhere must be repaid.

How long will industry submit to the levy of exhorbitant taxation? When will the revolt against financing Government for competition with private enterprise, not to mention the agencies seeking to control industry, begin? Even in these confused times it is obvious that mounting taxation to maintain agencies seeking to destroy the industries so taxed, must cease.

The Ten Point Program

●

SOME little time ago Secretary of Labor Perkins announced a ten-point program for labor legislation. Some progress was made in the last session of congress, but many of the objectives of the Labor Secretary are "on the calendar." Among these are:

Permanent limitation of hours of labor; standard minimum wages; old age pensions; adequate workmen's compensation; free public employment bureaus; more air-tight laws to administer and enforce labor legislation.

Industry may look forward to an active labor-legislation campaign in the next session of congress.

Industrial Disputes

●

A STRIKE is a concerted and simultaneous withdrawal from employment of employes for the purpose of impressing some demand upon their common employer, in accordance with a personal determination either by those who strike or their representatives.

Industrial disputes paralyze a nation's industry, waste millions of dollars, and frequently endanger the lives and health of the people by cutting off the supply of food and fuel from large centers of population to which the flow must be continuous if suffering is to be avoided.

A strike which interferes with the production and distribution of the necessaries of life is a conspiracy and all such controversies should be made subject to judicial determination.

METAL MINERS HOLD ANNUAL CONVENTION

HOWARD I. YOUNG

President, American Zinc, Lead and Smelting Company, and President, The American Mining Congress

THIRTEEN western mineral producing states, represented in the Western Division of the American Mining Congress, will hold their yearly meeting at San Francisco, Calif., September 24-29, inclusive. This division of the Congress covers the producers of gold and silver, copper, lead, zinc, iron ore, tungsten, sulphur, potash and other allied minerals. These minerals comprise a vast store of "natural resources," and as such are vitally affected by the plans and demands of the New Deal. Most of them have already been codified, although practically none has been operating under codes for any length of time. In all, these great industries and their allied groups represent approximately 25,000,000 people. Therefore, it is vastly important that the soundest and wisest administration of their affairs obtains.

W. S. Boyd, vice president, Utah Copper Company and Nevada Consolidated Copper Corporation, is national chairman of the western division. Serving with him and representing the 13 states are the following important mining men:

ALASKA — Ernest N. Patty, dean, Alaska School of Mines; Chas. D. Garfield, secretary, Alaska Chamber of Commerce.

ARIZONA—T. H. O'Brien, general manager, Inspiration Consolidated Copper Co.; Wm. Koerner, governor, Arizona Chapter, A. M. C., and general manager, Magma Copper Co.

CALIFORNIA—Philip Wiseman, president, United Eastern Mining Co.; G. Chester Brown, secretary, California Metal and Mineral Producers Ass'n.

COLORADO—R. M. Henderson, chairman, Colorado Metal Mining Fund; Robert S. Palmer, secretary, Colorado Chapter, A. M. C.

IDAHO—A. P. Ramstedt, vice president, Tamarack & Custer Mining Co.; J. F. McCarthy, president, Hecla Mining Co.

MONTANA—W. B. Daly, manager of mines, Anaconda Copper Mining Co.

NEVADA—J. C. Kinnear, Nevada Consolidated Copper Corp.; Henry M. Rives, secretary, Navada Mine Operators Ass'n.

OREGON—Robert M. Betts, president, Cornucopia Mines Co.; A. W. Strowger, attorney.

W. S. BOYD

National Chairman, Western Division

OKLAHOMA—M. F. Owens, president, Tri-State Zinc and Lead Ore Producers Association, and manager, Black Eagle Mining Co.; M. D. Harbaugh, secretary, Tri-State Zinc and Lead Ore Producers Association.

SOUTH DAKOTA—B. C. Yates, general manager, Homestake Mining Co.

TEXAS—Brent N. Rickard, manager, El Paso Smelting Works, American Smelting and Refining Co.; Howard H. Fields, American Smelting and Refining Co.

UTAH—J. W. Wade, governor, Utah Chapter, A. M. C., and vice president, Tintic Standard Mining Co.; A. G. Mackenzie, secretary, Utah Chapter, A. M. C.

WASHINGTON—Milnor Roberts, University of Washington.

When San Francisco was decided upon as convention city for this year's meeting, W. Mont Ferry, vice president and managing director, Silver King Coalition Mines Co., was selected as national chairman of the program committee. Mr. Ferry selected an industry-wide committee to serve with him, composed of the following representative operators:

ARIZONA—T. H. O'Brien, general manager, Inspiration Consolidated Copper Co., Inspiration; Robert E. Tally, United Verde Copper Co., Clarkdale; Ross D. Leisk, vice president, United Verde Extension Mining Co., Jerome; Wm. Koerner, general manager, Magma Copper Co., Superior.

CALIFORNIA—Dean Frank H. Probert, College of Mining, University of California, Berkeley; H. W. Gould, H. W. Gould & Co., Mills Building, San Francisco; I. Ballard, secretary, National Quicksilver Producers Association, San Francisco; W. S. Boyd, vice president, Utah Copper Co. and Nevada Consolidated Copper Corp., San Francisco; W. Val DeCamp, general manager, Cardinal Gold Mining Co., Bishop.

COLORADO—Chas. A. Chase, general manager, Shenandoah-Dives Mining Co., Silverton; George H. Rupp, manager, mining department, Colorado Fuel and Iron Co., Pueblo; Jesse F. McDonald, manager, Down Town Mines Co., Leadville; Robert S. Palmer, secretary, Colorado Chapter, A. M. C., Denver; John G. Clark, Tungsten Production Co., Inc., Boulder.

IDAHO—Stanly A. Easton, president, Bunker Hill and Sullivan Mining and Conc. Co., Kellogg; J. F. McCarthy, president, Hecla Mining Co., Wallace; Axel P. Ramstedt, vice president, Tamarack and Custer Consolidated Mining Co., Wallace.

MONTANA—William B. Daly, manager of mines, Anaconda Copper Mining Co., Butte; Dr. Francis A. Thomson, president, Montana School of Mines, University of Montana, Butte; J. D. Mackenzie, manager, American Smelting and Refining Co., East Helena.

NEVADA—J. C. Kinnear (state chairman), general manager, Nevada Consolidated Copper Corp., McGill; Henry M. Rives, secretary, Nevada Mine Operators Association, Reno.

NEW MEXICO—R. B. Tempest (state chairman), general manager, Chino Mines, Nevada Consolidated Copper Corp., Hurley; Dr. E. H. Wells, president, New Mexico School of Mines, Socorro; Ira L. Wright, general manager, Black Hawk Consolidated Mines Co., Silver City; C. A. Pierce, general superintendent, United States Potash Co., Carlsbad.

OREGON—Robert M. Betts, president, Cornucopia Mines Co., Blackbutte.

TEXAS—Brent N. Rickard (state chairman), manager, El Paso Smelting Works, American Smelting and Refining Co., El Paso; J. S. Cullinan, Petroleum Building, Houston; H. P. Henderson, president, Texas Mining and Smelting Co., Laredo.

UTAH—Oscar N. Friendly (state chairman), treasurer and assistant general namager, Park Utah Consolidated Mines Co., Salt Lake City; E. A. Hamilton, general manager, U. S. Smelting, Refining and Mining Co., Salt Lake City; D. A. Lyon, director, Utah Engineering Experiment Station, University of Utah, Salt Lake City; J. O. Elton, manager, International Smelting Co., Salt Lake City; W. J. O'Connor, manager, Utah Department, American Smelting and Refining Co., Salt Lake City; James W. Wade, general manager, Tintic Standard Mining Co., Salt Lake City.

WASHINGTON—Dean Milnor Roberts, head of Mines Department, University of Washington, Seattle; Frank M. Smith, Bunker Hill and Sullivan Mining Co.

In cooperation with the Board of Governors of the Western Division and the Program Committee, the National Board of the American Mining Congress, headed by Howard I. Young, president, American Zinc, Lead and Smelting Co., of St. Louis, as president, has taken an active part in the development of the meeting, which all agree will be the greatest they have held in many years. The following distinguished mining men form the National Board of the American Mining Congress:

Howard I. Young, president, American Zinc, Lead and Smelting Co., St. Louis.

D. D. Moffat, vice president, Utah Copper Co., Salt Lake City, Utah.

W. MONT FERRY

National Chairman, Program Committee

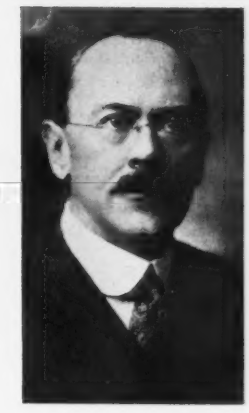
J. C. Kinnear

Brent N. Rickard

Oscar N. Friendly

Philip Wiseman

Milnor Roberts



William Daly

J. B. Putnam, Pickands, Mather & Co., Cleveland, Ohio.

D. A. Callahan, president, Callahan Zinc-Lead Co., Wallace, Idaho.

W. J. Jenkins, president, Consolidated Coal Co. of St. Louis, St. Louis, Mo.

Robert E. Tally, vice president, United Verde Copper Co., Clarkdale, Ariz.

Paul Weir, vice president, Bell & Zoller Coal and Mining Co., Centralia, Ill.

Donald B. Gillies, president, Corrigan-McKinney Steel Co., Cleveland, Ohio.

Clinton H. Crane, president, St. Joseph Lead Co., New York City.

A. B. Jessup, vice president, Jeddo-Highland Coal Co., Jeddo, Pa.

A. E. Bendelari, president, Eagle-Picher Lead Co., Cincinnati, Ohio.

Eugene McAuliffe, president, Union Pacific Coal Co., Omaha, Nebr.

Charles H. Segerstrom, president, Nevada-Massachusetts Co., Sonora, Calif.

Among the speakers at the convention are the following: Howard I. Young, president, American Zinc, Lead and Smelting Co.; W. S. Boyd, vice president, Utah Copper Co. and Nevada Consolidated Copper Corp.; Senator Key Pittman, from Nevada; W. Mont Ferry, vice president, Silver King Coalition Mines Co.; Governor Morley Griswold, of Nevada; Charles H. Segerstrom, president, Nevada-Massachusetts Co.; Paul Shoup, vice chairman, Southern Pacific Railway; L. Ward Bannister, attorney at law, Denver; Charles A. Chase, Shenandoah-Dives Mining Co.; J. C. Kinnear, Nevada Consolidated Copper Corp.; Ira L. Wright, attorney at law, Silver City, N. Mex.; Eugene McAuliffe, president, Union Pacific Coal Co.; R. C. Allen, Oglebay-Norton & Co., Cleveland, Ohio; J. F. McCarthy, president, Hecla Mining Co.; Dean F. A. Thomson, president, Montana School of Mines; Dean Frank H. Probert, College of Mines, University of California; Edward Snyder, Salt Lake City; Paul H. Hunt, Salt Lake City; A. W. Dickinson, Washington, D. C.; and many others, who will participate in the round-table discussions, where such important questions will be discussed as "The NRA," "Unemployment Insurance and Workmen's Compensation," and "The National Labor Board."

It is anticipated that out of the deliberations of the convention a platform will be developed that will receive the united support of all of the groups involved. And to this end special invitations have been extended to the Governors of the states and to the state mining associations to take an active part in the deliberations, and to attend a special conference immediately following the convention, for the purpose of appointing a ways and means committee to make the recommendations of the convention immediately effective.

The Hon. W. E. Colby, well known San Francisco mining attorney, will serve as toastmaster to the annual dinner, which will be one of the major features of the convention, with a distinguished list of guests and mining men.

A local committee will have charge of arrangements, and have planned an exceptionally interesting time for the delegates. A General Reception Committee is in charge of C. B. Lakenan, one of the best known and beloved mining men of the West; R. A. Kinzie, chairman of the local A. I. M. E. section, will serve as host to a reception for President Howard I. Young; and G. Chester Brown, California Metal and Mineral Producers Association, is arranging special trips.

The visiting ladies will have special entertainment. Mrs. W. S. Boyd will be official hostess, and will be assisted by Mrs. D. C. Jackling.

(*Continued on page* 20)

PROGRAM

THE AMERICAN MINING CONGRESS CONVENTION

Palace Hotel, San Francisco, California — September

Monday, September 24

9 A.M. REGISTRATION

10 A.M. OFFICIAL INSPECTION OF EXHIBITS

12 Noon OPENING OF CONVENTION
LUNCHEON MEETING

INTRODUCING:

HOWARD I. YOUNG
President, The American Mining Congress

W. S. BOYD
Chairman, Western Division

W. MONT FERRY
Chairman, Program Committee

J. F. CALLBREATH
Secretary, The American Mining Congress

2 P. M.

CHAIRMAN: W. S. BOYD
Vice President, Utah Copper Company and Nevada Consolidated Copper Corp.

APPOINTMENT, RESOLUTIONS COMMITTEE

REHABILITATION OF NON-FERROUS METALS

By W. MONT FERRY, *Vice President, Silver King Coalition Mines Company*

ADMINISTRATION OF SILVER BILL

By THE HONORABLE KEY PITTMAN, *Senator from Nevada*

Tuesday, September 25

10 A.M.

CHAIRMAN: J. F. MCCARTHY
President, Hecla Mining Co.

PLACE OF MINERALS IN INDUSTRIAL LIFE

By DEAN FRANK H. PROBERT, *College of Mining, University of California*

MINERS' RIGHTS TO SUB-SURFACE WATERS ENCOUNTERED DURING MINING OPERATIONS

By L. WARD BANNISTER, *Counselor-at-Law, Denver, Colorado*

12 Noon

ROUND TABLE DISCUSSION NO. 1
HOWARD I. YOUNG, *President, American Zinc, Lead & Smelting Co., Presiding*

TOPIC:

THE NATIONAL LABOR BOARD
Its personnel—functions—authority, real and implied—effect upon labor conditions—good and bad points.

DISCUSSION LEADERS:

D. C. JACKLING, *President, Utah Copper Co.*

W. MONT FERRY, *Vice President, Silver King Coalition Mines Co.*

ROBT. E. TALLY, *Vice President, United Verde Copper Co.*

R. C. ALLEN, *Vice President, Oglebay, Norton & Co.*

EUGENE MCAULIFFE, *President, Union Pacific Coal Co.*

STANLY A. EASTON, *President, Bunker Hill & Sullivan Mining. and Conc. Co.*

PAUL WEIR, *Vice President, Bell & Zoller Coal and Mining Co.*

W. VAL DECAMP, *General Manager, Cardinal Gold Mining Co.*

A. W. DICKINSON, *The American Mining Congress.*

2:30 P.M.

CHAIRMAN: GOVERNOR MORLEY GRISWOLD
State of Nevada

BENEFITS TO MINING INDUSTRY BY U. S. BUREAU OF MINES EXPERIMENT STATIONS

By DR. F. A. THOMSON, *President, Montana School of Mines, University of Montana*

WESTERN MINERAL INDUSTRY AND DISTRIBUTION AND UTILIZATION OF POWER FROM FEDERAL PROJECTS

By EDWARD H. SNYDER, *W. F. Snyder & Sons.*

THE PROBLEMS OF THE GOLD MINING INDUSTRY

By CHAS. H. SEGERSTROM, *President, Carson Hill Mining Co.*

Wednesday, September 26

10 A.M.

CHAIRMAN: CHAS. A. CHASE
General Manager, Shenandoah-Dives Mining Co.

ACCIDENT PREVENTION IN METAL MINES WITH SPECIAL REFERENCE TO GOLD MINING

By OSCAR A. GLAESER, *Safety Engineer, State Compensation Insurance Fund of California.*

...RAM

...NUAL MEETING, WESTERN DIVISION

...tember 24-29, 1934

DIAMOND DRILL PRACTICE

By M. G. HANSEN, *Field Geologist, Anglo American Mining Corp., Ltd.*

PLANNING FOR THE FUTURE WITH THE U. S. BUREAU OF MINES

By DR. JOHN WELLINGTON FINCH, *Director, U. S. Bureau of Mines.*

12 Noon

ROUND TABLE DISCUSSION NO. 2

TOPIC:

UNEMPLOYMENT INSURANCE AND WORKMEN'S COMPENSATION

Congressional proposals — labor organizations sponsoring—attitude of administration—state laws.

DISCUSSION LEADERS:

H. C. JACKSON, *Pickands, Mather & Co.—Iron Ore.*
IRA L. WRIGHT, *General Manager, Blackhawk Cons. Mines, New Mexico*
J. C. KINNEAR, *General Manager, Nevada Cons. Copper Corp.*
EUGENE MCAULIFFE, *President, Union Pacific Coal Co.*
G. CHESTER BROWN, *Secretary, California Metal and Mineral Producers' Assn.*
WM B. DALY, *Manager of Mines, Anaconda Copper Mining Co., Montana.*
M. D. HARBAUGH, *Secretary, Tri-State Zinc and Lead Ore Producers Assn.*

2:30 P. M.

CHAIRMAN: STANLY A. EASTON
President, Bunker Hill & Sullivan Mng. and Conc. Company.

PRACTICAL APPLICATION OF THE BITUMINOUS COAL CODE

By EUGENE MCAULIFFE, *President, Union Pacific Coal Co.*

TAXATION OF MINES AND THE LAW OF DIMINISHING RETURNS

By PAUL H. HUNT, *Salt Lake City, Utah*

THE PROBLEMS PRESENTED BY THE NEW REVENUE LAW

By A. W. DICKINSON, *The American Mining Congress.*

Thursday, September 27

10 A. M.

INDUSTRY'S RESPONSIBILITY

By PAUL SHOUP, *Vice Chairman, Southern Pacific Co.*

GOLD AND NATIONAL PROSPERITY

By HONORABLE TASKER L. ODDIE, *of Nevada.*

12 Noon

ROUND TABLE DISCUSSION NO. 3

TOPIC:

THE NRA

Its effect on the mining industry—good and bad points—shall it be permanent remedy—what should be kept, what discarded?

DISCUSSION LEADERS:

D. C. JACKLING, *President, Utah Copper Co.*
R. C. ALLEN, *Vice President, Oglebay, Norton & Co.*
P. R. BRADLEY, *Vice President, Bunker Hill & Sullivan Mining and Conc. Co.*
HOWARD I. YOUNG, *President, American Zinc, Lead & Smelting Co.*
W. MONT FERRY, *Vice President, Silver King Coalition Mines Co.*
PAUL WEIR, *Vice President, Bell & Zoller Coal and Mining Co.*
D. A. CALLAHAN, *President, Callahan Zinc-Lead Co.*
CHAS. H. SEGERSTROM, *President, Carson Hill Mining Co.*
R. A. KINZIE, *Consulting Engineer, San Francisco.*

2:30 P. M.

CHAIRMAN: D. D. MOFFAT
Vice President, Utah Copper Company

STABILIZATION OF NATURAL RESOURCES

By ROBT. E. TALLY, *Vice President, United Verde Copper Co.*

CODES AND INDUSTRY

By R. C. ALLEN, *Vice President, Oglebay, Norton & Co.*

REAL NEED FOR CENTRALIZED CO-OPERATIVE ACTION

By W. S. BOYD, *Vice President, Utah Copper Co. and Nevada Cons. Copper Corp.*

7:30 P. M.

ANNUAL DINNER

Toastmaster, THE HONORABLE W. E. COLBY

Introduction of guests of honor, including distinguished members of mining fraternity, Governors of western states, and state, federal and city officials.

Dancing—Entertainment.

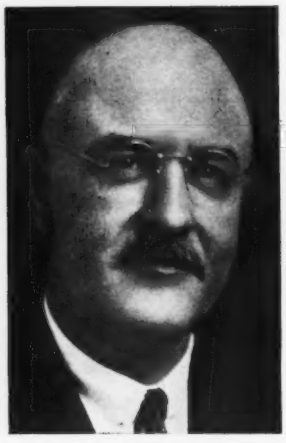
Friday, September 28

9 A. M.

CONFERENCE of presidents and secretaries of all western mineral organizations, for development of Ways and Means Committee to most effectively utilize the deliberations of the convention.

TRIPS

On FRIDAY, September 28, and SATURDAY, September 29, the local committee in charge will provide various elective trips for those attending the conference, which will embrace visits to nearby points of interest adjacent to San Francisco and to the Mother Lode country of California, if that be desired.



A. G. Mackenzie

G. Chester Brown

Jas. W. Wade

B. C. Yates

Wm. E. Colby

A. P. Ramstedt

A real feature of the convention is the exposition of mining machinery and supplies. The direction of this feature has been in charge of A. J. MacLean, of the Nevada Consolidated Copper Corp. Many leading manufacturers of mining equipment will participate, including:

The Allen-Sherman-Hoff Co.
American Manganese Steel Co.
The American Rubber Mfg. Co.
The American Brattice Cloth Co.
The American Zinc Institute.
Atlas Powder Co.
Braun-Knecht-Heimann Co., Ltd.
California Wire Cloth Co.
A. M. Castle Co.
Caterpillar Tractor Co.
Crucible Steel Co.
The Dorr Co., Inc.
Eastern Iron and Metal Co.
E. H. Edwards Wire Rope Co.
Garlock Packing Co.
General Cable Corp.
General Electric Co.
Harron, Rickard & McCone Co.
Hercules Powder Co.
H. J. Hersey & Co.
Jeffrey Manufacturing Co.
Mine Safety Appliances Co.
National Carbon Co.
Nevada-Massachusetts Co.
Pacific Steel Springs Co.
John A. Roebling's Sons Co.
Texas Co.
Timken Roller Bearing Co.
The W. S. Tyler Co.
Victor Welding Equipment Co.

A special feature of the convention will be the mineral states exhibit. This is sponsored by the 13 mineral-producing states of the West, and is designed to show their economic importance in our industrial life. They will show, as individual states, and collectively, such pertinent information as (1) number of mines, (2) number of men employed, (3) taxes paid, (4) communities wholly

(*Concluded on page* 24)

TRANSPORTATION ANNOUNCEMENT

The Chicago & Northwestern Ry. has arranged to set up special Pullman sleeping cars to move from Chicago to San Francisco on the famous "Overland Limited," using the following schedule:

Lv. Chicago, via C. & N. W.	**9.35 P. M. Sept. 20**
Lv. Omaha, Nebr., via Union Pacific	**10.35 A. M. Sept. 21**
Lv. Cheyenne, Wyo., via Union Pacific	**9.10 P. M. Sept. 21**
Lv. Ogden, Utah, via Southern Pacific	**9.00 A. M. Sept. 22**
Ar. San Francisco, via Southern Pacific	**8.30 A. M. Sept. 23**

Those joining the party in Chicago or picking up the party en route, please communicate with Mr. H. G. Van Winkle, General Agent, Chicago and Northwestern Ry., 148 South Clark St., Chicago, Ill., advising space desired and point at which you will join the party.

Have your ticket routed C. & N. W.-U. P., S. P., from Chicago

Main Shaft, Inspiration Consolidated Copper Company

The Economic Importance of Copper

By DR. H. FOSTER BAIN *

COPPER MINING is distinctly a western industry. Among states east of the Rocky Mountains, Michigan alone is an important producer. Even individual western mines stand out as of state and national significance. As A. B. Parsons has well said, "Utah copper easily looms as the biggest single asset of the State of Utah," and the Anaconda enterprises occupy a corresponding position in Montana. Hoval A. Smith has pointed out that in Arizona the copper mines paid up to 60 percent of the state taxes during the war period, and 45 percent in that following. Mr. Parsons has calculated that through the 20 years ending in 1931, the copper mines in that state paid 28 percent of the general tax in addition to Federal, county, school, and town taxes. So intimately, indeed, is copper mining tied in with the prosperity of the West, that the recent depression in the industry has threatened the very continued existence of certain states.

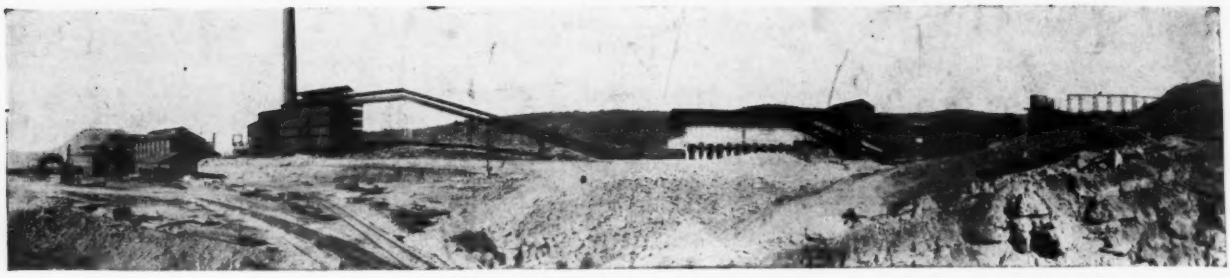
Mines, as has frequently been said, are where you find them. The miner has no choice in the matter. He must go to where the ore exists. The geological processes which lead to the formation of great ore bodies, are also generally those connected with mountain making or desert conditions, and are not those which render a country most favorable for other industries. If the mines fail, or their output remains unsold, there is no alternative occupation for the employes. A depression, therefore, hits the mining states with peculiar force.

It is no secret that through this depression the copper mines have been kept in operation, where they have been, primarily to make work for staff and men. One of the large properties has kept a considerable fraction of its normal staff at work and has not sold a pound of copper since the price broke. Not all have been able to do so well, but all the companies have made great sacrifices of capital and of ore to keep alive the communities dependent upon them. If economics rather than social responsibilities had been allowed to dictate policy, few if any would have continued to operate. Fortunately the tide has turned, the large surplus stock is being eaten into and mining has begun to be resumed or expanded.

While copper mining is peculiarly a western industry, the reduction, refining, and fabrication of copper and its alloys is a national one. Wisconsin, Illinois, Ohio, New Jersey, New York, Connecticut, and Massachusetts are as vitally concerned with copper as are Michigan, Montana, Utah, Nevada, Arizona, and New Mexico. Copper in the first stages of manufacture occupies a large place among the industries of each of these states. When it passes this stage and goes into wire drawing, machine building, equipment manufacture, and all the thousand and one forms in which it reaches the ultimate consumer, there is hardly an important community in the United States which does not have some interest in the metal from the producer down to the consumer.

As the leading nonferrous metal, copper and its alloys enters nearly every industry. Roughly 80 percent is used as copper in some form and 20 percent in alloys. Its many useful qualities—high conductivity for heat and electricity, strong resistance to corrosion, beauty of color, and its remarkable machinability—have led to its being woven in as a part of almost the whole texture of industry. Substitution is possible and is practiced to some extent, but at a cost in money or results, and it seems clear that there will always be a big field for copper and its alloys; one in which it can give better and cheaper service than any other metal.

* Director, Copper & Brass Research Association.



Smelter of the Magma Copper Company

Maintenance of a healthy copper industry is, therefore, a matter of national importance.

When the whole of industry turns sick, it is inevitable that no single material used as widely as is copper can escape the effects of the depression. It is also clear that nothing the copper producers could do on their own initiative would give them alone prosperity. The industry is too large a fraction of the whole, and depends on too widespread contacts to move against the current. It happens that substantially two-thirds of the copper consumption of this country is in the electrical industries. While they remain inactive, no practical amounts of promotion of the use of copper in other industries can be sufficiently large to make up for such a deficit in use.

One of the larger fields for use of copper, too, is in houses, but with the construction industry lagging, even the offering of new products, new processes, and marked reduction in prices, can do little to stimulate demand. In a normal building year the copper industries benefit to the extent of less than 2 cents for each building dollar. Even with copper selling at an all-time low, it is clear that building costs can be but little affected. Whether they like it or not—and there is no evidence that the men in the copper industries ever have hoped for an exemption from the common lot—we are all in one boat.

In one particular this being bound by the common rules of experience is especially annoying. It has been a continual source of irritation that, with the price of copper itself cut to one-third or less of that ruling before, the price of copper in the form in which it reaches the ultimate consumer has been so little changed. Copper, however, is a raw material and usually but one of a number used in making up an article sold to the public. Raw sugar is now selling at 1.8 cents per pound, with refined at 4.75 cents; but the pound of choice candy you take home when you want to make up with your wife costs $1 or more. Scoured Texas wool is selling at 8 to 10 cents per pound, but an all-wool suit, weighing 2 to 3 pounds, sells for $25, and much more. It is impossible to correlate closely the retail sale price with that of any single raw material entering into an article. It is not only that other materials are also used, but that labor and overhead enter into manufacture, and transportation and distribution costs remain unaffected by changes in material costs. It costs as much per pound to draw wire or tube, to roll sheets or to fabricate shapes, whether the copper used sells for 4 cents or 24 cents, and the cost of marketing remains the same.

Repeated studies have shown that the spread between the cost of electrolytic copper and a copper household utensil, for example, is on the average about the same as with other goods. The high price paid by the ultimate consumer, where it is high, is not often or greatly out of line with that of other similar articles. Copper producers have spent much time and thought on this problem, and some progress is being made in simplifying distribution and in reducing costs, but it is again a problem of general industry rather than one for copper men alone.

The copper industry is doing, and has done, its full part in bearing the burdens of the depression and in stimulating recovery. The most thorough and drastic reorganizations and economies have been put into effect and great sacrifices have been made. Earnest effort has been directed toward finding new uses, toward reduction of cost, and toward simplification of distribution. It is now possible to furnish copper for roofing and vertical surfaces, with the beautiful natural patina at the time of erection, instead of waiting for the slow processes of Nature. It is also now possible to coat copper with a layer of clear or colored glass, so thin that the sheet remains sufficiently flexible to permit the strains incident to erection. This opens the whole field of color, with a lasting surface on a lasting material, to architects. It is even possible now to chrome plate copper in sheets, hence inexpensively, and then shape it for building and other uses. The shining sheets on the Ford building at the Century of Progress are this chrome-plated copper. It has been demonstrated by field plot experimental studies that copper has a use as a plant food, and for certain crops in a number of states copper is this year being included in fertilizer. It has been shown that molden steel can be poured against copper without melting the latter even though it is 1,000 degrees hotter, and as a result copper stools for ingot pouring, with many times the life of the iron stools heretofore used, are being rapidly introduced. It has been found that steel can be made stronger with less interference with its ductility by introduction of copper than by any other means at

(*Concluded on page* 24)

Chino Mine of Nevada Consolidated Copper Company

Some Thoughts on Silver and the Orient

By W. MONT FERRY *

THE economic picture which our country presents today still shows more shadows than lights. Although suffering and want while still largely prevalent have been alleviated by Federal relief, aided somewhat by state and local units, unemployment among our people remains the most serious problem our country has ever faced.

Congress recently has passed numerous measures, many of which have been beneficial, and some of which were necessary to prevent disaster. The President, with rare courage and wisdom, has exercised some of the great authority given him in an effort to stem the onrushing tide, which threatens to engulf our people. The Government at Washington has taken charge of affairs —has asserted leadership and assumed responsibility. This has tended somewhat to stabilize men's minds and to reawaken hope. At the same time it is being generally realized that the unprecedented money expenditures which emergency measures involve will some day have to be met from the pockets of the people. Confidence is still timid. Apprehension for the future still controls normal activities. Men will not engage in productive endeavor unless there exists reasonable assurance of economic stability, or a conviction that measures are developing which give hope that commodity prices will ensure a just reward for honest effort.

There is little evidence that commodity prices are arising excepting those few commodities which receive some kind of Federal bonus or have been made unusually scarce by natural causes.

There must be an end to Government spending, even in the great cause of relief; likewise there must be an end to the artificial measures which control and restrict the natural activities of industry, however meritorious these measures may be as temporary expedients, if our countrymen are again to exercise the liberty, initiative and independence to which they have been accustomed.

While the sufferings which we as a people are enduring and the admitted dangers which threaten us are due, no doubt, too many cumulative causes, for some of which the people as a whole are responsible, there is ample authority for the conviction that the fundamental cause of the unprecedented conditions which have prevailed for the past five years is the collapse of our money and credit structure. This structure was founded upon gold alone. It was called the gold standard and has prevailed quite generally in the principal industrial countries. The gold standard, as it has been administered, has tragically failed. With two or three exceptions, all the world is now "off gold." There is not enough of the yellow metal to form a sound money base and to meet the requirements of increasing industrial activity. The annual production of gold has reached its apex and is soon destined to decline. It is too rare and consequently has been hoarded by nations until two countries, France and the United States, hold more than 70 percent of all the monetary gold in the world, while the rest of the world scrambles for the remaining 30 percent.

The rarefication of gold was inevitable when silver was discarded as basic money. The demonetization of the white metal was carried on gradually and its effects were not immediately felt by labor and industry. Not until some years after the great war did realization begin to come, and then it came with stunning force.

Dear money and cheap commodities mean drastic liquidation, debt repudiation, wholesale unemployment and utter stagnation of trade, which in turn are followed by discouragement, despair, social unrest, strikes, lock-outs and political, economic and social chaos. These manifestations have shown themselves in our country, as well as abroad, during the past five years, and their presence can be no longer doubted, nor can their significance fail to be understood.

One important phase of the destruction of the money status of silver may be realized by considering the effect upon world economics which has resulted from the loss of buying power of silver-using peoples.

Mr. René Leon, recognized as a world authority on exchange, in testifying before the United States Senate Finance Committee, said:

"The deliberate depreciation of one of the two principal money metals by shifting upon the other the whole burden of world finance, has merely succeeded in rarefying it, and has initiated the mad rush for gold, which is still raging and which is disrupting the economic structure of the entire world. Times without number Britain was warned of the consequences of such action. No less eminent figures than the governors of the two principal central banking institutions of the empire, have issued the warning. Both Mr. Montagu Norman of the Bank of England and Sir Osborne Smith of the Imperial Bank of India, are on record.

"Added to these are innumerable Britons of distinction who constantly are calling their Government's attention to the frightful conditions which it has brought about, and which it persists in perpetuating. Yet not a word is spoken by the responsible government officials in justification of their action. Those who profit by low silver because they control the China trade seem firmly entrenched in the British treasury and in the India office. There are also British officials who believe that low silver makes for better control of Indian affairs. Be they interested slave drivers or misguided politicians, the result is the same. By their actions white men the world over, Britains and Americans alike, are being subjected to the ruinous competition of the coolie. By injecting into our price system the powerful factor of price destruction which low silver constitutes, they are wrecking the world's industrial machinery and of the once imaginary yellow peril they are making a reality."

Mr. Montagu Norman, governor of the Bank of England, has made the following statement:

"The immediate effect of the announcement that the Indian Government contemplated the sale of a large quantity of silver would be to throw out of gear the exchanges with China and for a time to paralyze trade with that country. There would be a tremendous disturbance of internal prices in China, a shock to public confidence, I should fear,

* Vice President and Managing Director, Silver King Coalition Mines Co.

unwise and panicky attempts to get out of the difficulty by resort to what in present circumstances would, I think, be unsuitable to China, namely a gold exchange standard. All those things would react upon this country very seriously. I think that one has also to bear in mind the interaction between gold and silver prices. THERE IS A REACTION UPON GOLD PRICES WHEN AN EXTREME RISE OR FALL TAKES PLACE IN THE VALUE OF SILVER WHICH IS NONE THE LESS SERIOUS BECAUSE IT IS INDIRECT AND NOT VERY APPARENT ON THE SURFACE.

"The consequential changes in prices generally and in trade conditions which would be produced, the disturbance to the world's economic peace and confidence, the interference with the long established social habits of the people of India in the use of silver, the shock to the reliance of a great country like China upon silver as a medium of currency and a common store of value, could not fail to have important effects upon the gold prices of countries in Europe, and indeed in America."

Sir Osborne A. Smith, governor of the Imperial Bank of India, states to the *London Times* that there is not so much an over-production of goods as there is a destruction of purchasing power, and concludes: "Our job then is to recreate purchasing power, and we have the instruments at hand in silver of which these masses (the Orientals) are possessed. The remonetization of silver will furnish us with the needed purchasing power and will cause to disappear through consumption the world overproduction of goods."

Sir Robert Horne, ex-chancellor of the British Exchequer, quoted in the *New York Times*, says:

". . . rehabilitation of silver would help more rapidly than any other device to raise commodity prices and restore trade which in recent years has disappeared, owing to the abnormal decline in the value of silver . . . depreciation in the value of silver in recent years, through government sales of discarded silver coin in the silver countries, has lessened the values of savings of a thousand million of people in the east, and it has imposed a check upon purchases which would have been made from the factories of America . . . If the leading nations were to (again) constitute silver a part of their metallic reserves, this degenerating process would be reversed."

The Chinese National Committee for Silver in a memorandum addressed to the International Chamber of Commerce, says among other things: "At the present, owing to the collapse of silver, the purchasing power of no less than one-half of the world's population is being affected. Thus the manufacturers in America and Europe are having difficulty in distributing their surplus goods to silver countries. As a result the surplus of raw materials of these countries are not properly absorbed by the manufacturing nations. Thus the silver catastrophe plays a very important part in the present world depression. In order to break this vicious circle of depression it is necessary, first to restore the confidence of the people in their purchasing power."

Mr. K. C. Li, a member of this Chinese National Committee, speaking in New York City before the Foreign Policy Association, said:

"Gold standard countries suffer just as much as silver standard countries, if not more. It is principally because of the low price of silver that your surplus products cannot be directly distributed in Asia and indirectly in Europe and South America."

Investigations of this phase of the silver question by authorized committees from both Houses of our Congress, have resulted in reports which have aroused our legislators to the importance of silver as a remedial factor in the solution of many of the great problems which confront this country.

Furthermore the low purchasing power of silver is forcing the Orient to industrialize.

In the *New York Times*, Mr. J. H. Carmical, a financial authority, says:

"For the first time in history the Western World is keenly feeling the industrial competition from the Far East. This competition, according to those who have made a close study of the situation, reflects lower production costs in the Far East, due to a lower wage scale, comparable mechanization, which has been imported from the Occidental nations and the low price for silver and the Japanese yen which, because of the proximity of Japan to China and other silver countries, is closely wedded to silver."

While high tariffs may succeed in preventing China and Japan from dumping their fabricated goods on our home markets, there are no means available to prevent them from entering other markets which heretofore have been ours and absolutely driving our merchandise out of the picture. Make no mistake; this is no theory but an unpleasant fact, which unless corrected will either force our people out of world markets or will drag down our standard of living to the level of the coolie and the peon.

The industrialization of the Far East has made rapid strides during the past few years. Cotton goods factories and cigarette factories have sprung up like mushrooms in the Chinese treaty ports, financed by Japanese, British and American capital. These factories supply finished goods which heretofore came largely from our own factories where literally tens of thousands of our countrymen were employed, but which now have been closed, and in some instances, transferred bodily to China. Enormous profits have resulted from these Chinese operations because of cheap labor and cheap internal costs. It is reported that cotton manufacturing plants since 1932 have made profits of from 50% to 75% on invested capital per annum. The obvious result of such Oriental industrialization is not only to close the Far East to our fabricated products, but also to take away from our people whatever other markets the Orientals can reach.

Unwise legislation which debased the white metal is responsible for this condition. Remonetized silver—recognize it as a primary money—and the stranglehold which gold has upon mankind will be broken. Foreign and domestic trade will revive, unemployment will be absorbed by industry, commodity prices will make productive endeavor profitable and the spirit of hope will drive out despair.

Money will cease to be the master and will again become the servant of mankind.

Metal Mines Hold Annual Convention

(*Continued from page* 20)

or partially dependent upon mining, (5) industries dependent upon products of mines, and such other data as will show clearly just how minerals enter into the prosperity of this country. States participating in mineral states exhibit: California, Colorado, Cœur d'Alene, Nevada, New Mexico, Texas, Tri-State District, and Utah.

On September 28-29 the local committee is arranging for a series of elective trips to points of interest in California.

The Economic Importance of Copper

(*Continued from page* 22)

the same cost. Fortunately, too, the good effects of the copper are additive to those of other alloying elements. The individual copper companies have developed silicon and other copper alloys having the strength of steel and corrosion-resistance of copper. Still other alloys showing remarkable fatigue resistance, or other desirable properties, have been produced. Sheet copper, thin enough for use as paper and hence invaluable as a medium for permanent records, is now manufactured direct in the electric cell, thus avoiding the cost of melting cathodes and rolling them down. All these and many other steps in progress have been made.

Under ordinary business conditions it is not unusual for five years to elapse between successful laboratory work and attainment of even a small distribution of a new product. Under the conditions of the past five years progress has inevitably been much slower. Enough has been said perhaps to make clear that just as the copper industry has not found it possible to go forward when the rest of the nation's business was falling behind, it has been laying a sound foundation for a rapid and effective advance when conditions improve for the country as a whole.

POTASH--

Past, Present and Future

By HORACE M. ALBRIGHT*

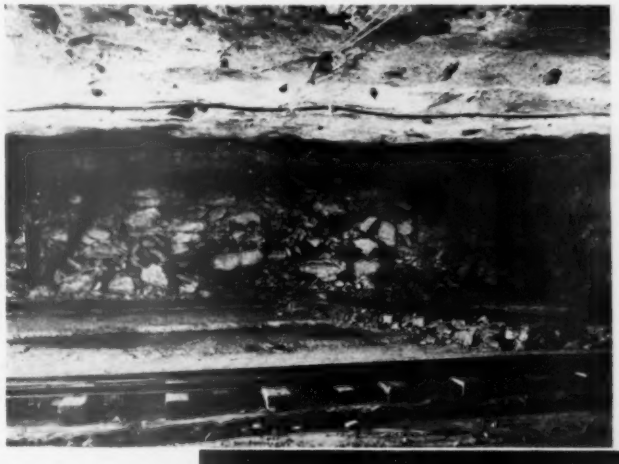
THE MINING of potash salts is now a permanent industry in the United States. The mines are near Carlsbad, and they have the capacity to supply the potash requirements of this country for a long time to come, perhaps forever. During the World War, when the German potash was temporarily excluded from the American market and there was overwhelming demand for the chemical in various forms by both agriculture and industry, it was produced at great expense in 128 hastily developed plants, and at that time there was some production through mining in the West. The maximum war-time production by all mines and chemical plants was 54,803 tons of pure potash—(K_2O). Prices soared to nearly $600 per ton of potash salts. Only one important plant survived the war. This is the American Potash and Chemical Company's plant at Trona, Calif., where potash is taken from the complex highly mineralized brines of Searles Lake, Calif. All of the potash mining enterprises in the United States were discontinued when the German product reentered the American market in 1919, because they could not compete with the foreign mines.

It has been estimated that $50,000,000 was expended in war potash developments, and, of course, much of this was lost to those who invested in them.

Thoroughly aroused by the dangers of dependence on foreign supplies of a commodity so essential at all times and especially in periods of great emergency, the American Government resolved to find, if possible, a permanent source of water-soluble potash. Accordingly, it authorized the Bureau of Mines and the United States Geological Survey to explore through core-drilling operations in several Western states where previous studies had developed evidence of the presence of potash bearing salts. Funds totalling $500,000 were made available over a five-year period. The two Government agencies working in their respective fields of operation and scientific research and with characteristic efficiency and thoroughness, directed the sinking of 24 core test holes and analyzed the results. They found potash in Utah and Texas and New Mexico, and in the latter state they found it in the form of sylvite (potassium chloride) about twice as rich as the German deposits. Meantime, and before sylvite was found in Government tests, Snowden & McSweeney Company, oil operators, while drilling an oil well east of Carlsbad, N. Mex., discovered potash. This was in 1925. V. H. McNutt, engineer for the oil company, brought the core tests to the attention of the Government authorities, who analyzed them, and henceforth the oil men cooperated with the Geological Survey in the exploration work, independently sinking many tests.

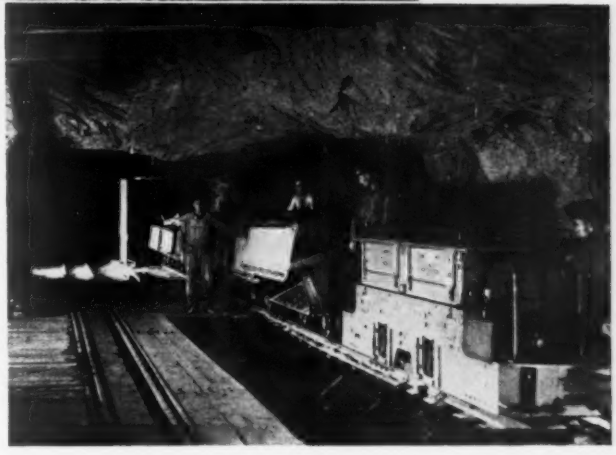
The result of all these explorations was that potash in grade and quantity justifying large investments in mining development, refinery and other plant and equipment was found in the Pecos Valley of New Mexico in what geologists call the Permian Basin.

It is interesting to note here that up to the end of 1933 95,003 ft., or 18 miles, of drill cores were taken from this basin. Exploration is still in progress.



The New Mexico potash-bearing lands are owned by the United States and the State of New Mexico, with here and there a private holding, usually an old homestead.

Permits are granted by the Government authorities and in the case of the



Above—Typical Room Heading

Right—Underground Loading Pit at Foot of Shaft No. 1

* Vice President, United States Potash Co.

Head Frame and Surface Buildings

Federal Government land, drilling must be done to hold the permit beyond the initial term.

Leases are granted when adequate ore bodies have been found justifying the investment necessary to extract and market the potash. The State of New Mexico has granted several leases, but the United States, through its General Land Office, has granted leases only to the United States Potash Company, Inc., and to the Potash Company of America. Royalties are paid under all leases, and 37½ percent of Federal royalty proceeds go to New Mexico—an allocation authorized by law.

These two companies just mentioned are the only producing concerns in the field. Others are exploring, but apparently have not discovered bodies of ore extensive enough to warrant the heavy expenditures which the Government rightly requires under its development policies.

The United States Potash Company has two shafts, 2,200 ft. apart. The first shaft, completed in 1931, is 1,062 ft. deep.; the other, completed in 1933, is 1,000 ft. in depth. The Potash Company of America completed its single shaft in 1934. It is nearly 1,100 ft. in depth. Both shafts have opened up potash ore bodies of sylvite or potassium chloride (KCl). The pure potash content averages about 25 percent K_2O. The French and German mines average about 14 percent K_2O. The mines are planned on the double-entry system, with provision for rooms, blocks and pillars permitting heavy extraction on first mining. Modern equipment, electrically operated, is used in both mines. The salt is first undercut with the latest undercutting machines, and after shooting is loaded on cars with both scraper and shovel loaders. Mine plans and projects are approved by the United States Geological Survey.

The United States Potash Company's mine is now equipped to hoist 2,000 tons per day but with small expenditures the capacity can be greatly increased. The mine of the Potash Company of America is still in course of development, and its capacity for production has not been announced, but it is expected that it will be large.

At the United States Potash Company's mine the ore is brought to the surface, where it is crushed at once to 10-mesh fineness, for shipment as manure salts to the fertilizer trade. At the Potash Company of America mine it is understood there is a primary crusher at the foot of the shaft and a sizing plant at the surface.

The United States Potash Company has a refinery about 16 miles from its mine. This plant is near the Pecos River and is connected with the mine by a tramroad belonging to the Company. The capacity of the refinery, recently doubled, is about 400 tons per day. The refined product is muriate of potash, a pure potassium chloride (99 percent KCl). It is understood that the Potash Company of America contemplates building a refinery.

Miners and refinery workers of the United States Potash Company dwell in the city of Carlsbad and are transported by bus to and from work. Most of the employes of the Potash Company of America dwell on the company's property some 20 miles northeast of Carlsbad. Workers are well paid. All operations are under the NRA code for the Chemical Manufacturing Industry.

Carlsbad has excellent schools, library, churches, and up-to-date stores and other commercial establishments. It is a city of homes and fine people. The climate is perfect, except that in summer the temperatures are high at times. Not far distant is the famous Carlsbad Caverns National Park, containing the largest, most beautiful and best-lighted caverns in the world and the best equipped to handle visitors.

So there are in New Mexico modern mines splendidly equipped to supply America's potash requirements. These mines produce salts high in potash content. There is a large refinery manufacturing high-grade muriate of potash, 99 percent pure. There is possibility of another refinery in prospect.

In California, at Trona, the American Potash and Chemical Company manufactures high-grade muriate of potash and several other products—borax, soda ash and salt cake. The potash production this year may reach 180,000 tons.

With a muriate capacity of about 140,000 tons at Carlsbad and 180,000 tons at Trona there is a potential annual American production of 320,000 tons of this high-grade potash salt. It is doubtful if the American market in 1933 absorbed as much as 200,000 tons of muriate.

It is evident that not only can the American market be fully supplied at the present time by domestic producers, but potash is already overproduced in this country. Competition is keen.

The Government having achieved its aims in obtaining reasonable development of its New Mexico resources, thus making this country completely independent of foreign producers and at the same time making certain that competitive conditions will continue, should now prevent over-exploitation of its potash field which could only bring unemployment, loss of invested capital and other disastrous results. A conservation policy is due and this Administration is

(*Concluded on page* 54)

Refinery of the United States Potash Co., Inc.

Developing

The American Tungsten Industry

By WILLIAM LOACH *

PRIOR TO 1902, the world consumption of tungsten was very slight and the ore used was a by-product from the tin mines in Cornwall, England. From this, Germany manufactured "metallic tungsten powder." That was used in very small quantities in the manufacture of what was then known as "self-hardening steels," which contained approximately 7.50 to 8.50 percent tungsten, and was only used for special purposes.

Comparatively small amounts of this steel were used for tack dies and machine tools. No heat treatment was required, the blacksmith forged the machine tools to proper size and shape, allowed them to cool in the open air, after which they were ground and used. Hence the name "self-hardening steel."

Prior to 1902, practically all of the turning, boring, and machining was done with various kinds of carbon steels and, while the work was well done, it was a slow and tedious process, and to go back to it would be setting progress back at least 50 to 100 years. In fact, steels that were made 30 years ago—on account of their composition and the method of manufacture—probably could not be sold today. They would not meet the improved conditions. The whole process of steel manufacturing has been completely changed during the last 20 years, and the present product is far superior in every way.

When using carbon tool steels, the product to be machined had first to be annealed—or softened—and even then only very light cuts, at a slow speed, could be taken. It was also necessary to grind and change tools often, making the machining operation an expensive one. About 1902 or 1903, the first tungsten high-speed tool steels were developed and manufactured on a commercial scale in this country. This was the beginning of a revolution in machining and manuacturing of all kinds. Materials that formerly had to be ground on account of their hardness, could now be machined. The existing lathes, boring mills, etc., were not heavy enough to pull the larger cuts which tungsten high-speed steel would take. As a result manufacturers—in the course of time—scrapped their plants and installed new machinery so as to speed up production with tungsten steel, and cut their costs.

The known tungsten was rapidly being consumed and it was not long until there was a shortage, particularly for American consumption.

Our parent company, the Firth-Sterling Steel Company of McKeesport, Pa., were manufacturing their standard brand of "Blue Chip" high-speed tool steel, and on account of this shortage of tungsten found it was necessary and advisable to secure our own source of supply in America if possible. Therefore, we became interested in certain tungsten properties in Boulder County, Colo., in 1904. During a period of 30 years we have been adding to our mineral acreage and have built an up-to-date tungsten concentrating mill.

We have spent large sums of money in the hopes that some day the tungsten business would be stabilized and the properties could be properly developed and put on a sound producing basis.

Beginning with 1904 all of the tungsten ore was mined from the surface, and there were many tons of float being picked up and, as a result, with the rich surface ore, it was comparatively easy to mine and sell on a basis of $5 per unit for 60 percent concentrates.

As the demand increased tungsten was discovered in California, Arizona, Nevada, Idaho, Washington, and South Dakota. Many companies were formed in these various states and tungsten produced by them. The history of the majority of these is about the same as the companies in Boulder County, Colo. The failure of so many tungsten companies and the closing down of the properties has been caused almost entirely by fluctuating and unstable prices—due to foreign importations—together with increased cost of production.

After 1905 many companies began manufacturing high-speed steel in this country, prices of 60 percent concentrates fluctuated from $5 to $11 per unit by 1907—when the panic brought business to a standstill.

Tungsten was found in other countries. The South American and Australian fields were discovered and ores were imported from these countries in competition with American products.

At that time steel companies made their purchases direct from the various mining companies, and foreigners, and had adopted a smelting method whereby the ores were reduced to ferro tungsten, which was more satisfactory than metallic tungsten powder.

Each steel company had its own smelting process, which was somewhat crude, and their recoveries were low and costs high.

On account of foreign competition, the tungsten operators and users were successful in obtaining a 10 percent tariff in the Payne-Aldrich bill. They only received the benefit of this for a year or two, when it was taken off.

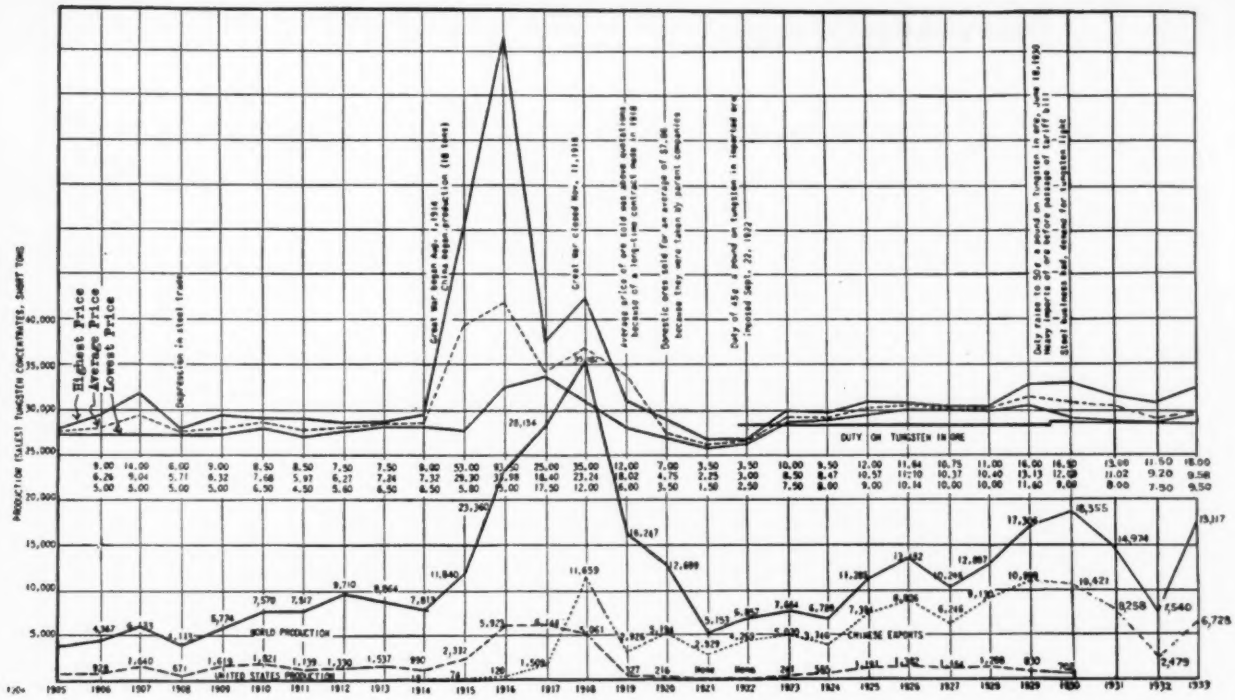
In the meantime, the surface production of American mines had been taken out and consumed and deeper mining—with lower grade ore and increased costs—was necessary. The lower grades of ore are much more complex than were the surface ores and require large investments and expensive milling equipment to recover a satisfactory grade.

With fluctuating prices, properties were closed down, and when we came to the World War, tungsten being a necessity—in fact the key mineral—and absolutely vital in turning out the necessary munitions of all kinds, as well as equipment, a real shortage was found to exist. Prices rose as high as $100 per unit and it was at this time, the large surface deposits were discovered in China with the result that just before the close of the war, Chinese tungsten was dumped into America and Europe in unheard-of quantities, which practically ruined the industry as a whole.

The American tungsten industry still has this Chinese competition to face and unless it is amply protected against extremely low-cost Chinese material (this mainly on account of low wages, surface production, etc.), it will be put out of business entirely.

After the war certain large manufacturers of ferro alloys used by the steel companies—such as vanadium, chrome, silica, manganese, cobalt and others—began making ferro tungsten for the steel companies using almost entirely foreign ores.

* Vice president and general manager, the Wolf Tongue Mining Co.



Production and Prices of Tungsten Concentrates in the United States 1905-1933*; World Production,* 1905-1933 *and Exports from China,* 1914-1933

On account of their being active in so many alloys and supplies used by the steel companies, and tungsten being the smallest amount required in most cases, it was only natural that they furnished ferro tungsten to steel companies at exceptionally low and attractive prices in order to get their other business.

The procedure was to purchase cheap foreign ores in large quantities for the benefit of the various steel companies and not charge the customer until they actually shipped the refined ferro tungsten. Their recoveries were so much higher than the customer could make and their costs so much lower that all of the steel companies ceased manufacturing ferro tungsten.

This put the American tungsten producer at great disadvantage since all of his customers, to whom he formerly sold had faded out of the picture and he was required for a long time to look to only one or two companies for the sale of his ore and those companies were more interested in cheap Chinese ore than they were in American production. This is one reason why the American producer has never had the full advantage of any tariff since large amounts were imported prior to the enactment of tariff bills, which has continually depressed the market.

There is no question but that tungsten is a key mineral in the production of all sorts of commodities in this country—automobiles, railroad equipment, farm equipment, radios, airplanes, and, in fact, most anything which must be turned out by machining, to say nothing of X-ray and electrical lighting equipment.

The saving in electrical consumption in lighting alone in the United States would more than pay for all of the tungsten that is consumed in this country annually.

On account of foreign competition and widely fluctuating prices no company can afford to spend large sums of money in systematically developing its tungsten properties. On this account it has been a matter of trying to make the mines pay as we go and we have not been successful in doing so. If we were assured of a minimum price—say $16 to $18 per unit—we could afford to properly develop our mines and America could supply its own tungsten needs.

In 1918, the United States Tariff Commission made an exhaustive study of the domestic tungsten situation. Comprehensive information and testimony as to the actual conditions may be found in the files and testimony taken in Denver, Colo., on June 17 and 18, 1918, and in San Francisco, Calif., on June 28, 1918.

In 1919, the tungsten operators secured a tariff on tungsten. If the hearings before the House Ways and Means Committee on H. R. 4437 are consulted, the full story regarding tungsten will be found, not only from the producers standpoint, but also from that of many consumers.

The tariff on tungsten was adopted in Tariff Bill H. R. 7456 in 1922—Report No. 212.

At that time tungsten was a drug on the market—not only in this country but in Europe as well—due to the enormous supplies left on hand at the close of the war. This applied to high-speed steels of all kinds—high speed steel scrap, tungsten ore, ferro tungsten, tungstic acid and metallic tungsten.

The tariff bill, as we understood it, covered the entire field of tungsten; i. e., finished manufactured products as well as raw materials and tungsten steel scrap. However, the Treasury Department ruled, early in 1928, that the phraseology of part of the tungsten tariff bill which stated that material containing "molybdenum and tungsten" could not be construed as though it read "molybdenum or tungsten." The Edgar Allen Company, Inc., and others, shipped in a certain amount of steel and scrap containing tungsten and contended that so long as the steel contained either tungsten or molybdenum not one in combination with the other, it could be admitted as ordinary steel or scrap under the general tariff bill; namely, 75 cents per ton. A case was brought in the Court of Customs Appeals and the decision may be found in "Treasury Decisions" on page 66, under date of April 26, 1928, sustaining their contention.

As a result of this decision, large quantities of high-speed steel scrap were manufactured and shipped into this country in ideal form for the manufacture of high-speed steel and this depressed the market for tungsten ore for several years.

In June, 1927, the Tariff Commission made another investigation with reference to the domestic tungsten situation. They audited the books of the various tungsten companies and their engineers and economists examined the properties and recommended an increase of 10 percent in the tariff. This was subsequently adopted—after further hearings before

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Trends and Opportunities

In Gold-Ore Treatment

By A. W. ALLEN*

ADOPTION of flotation for treating gold ores has increased rather than decreased the scope for application of the older processes of amalgamation and cyaniding. Extremely low-grade material, if available in quantity, is now susceptible to profitable exploitation. Coarse gold can be removed and recovered by amalgamation before flotation of a gold-ore pulp. Cyanidation remains the most direct and satisfactory method of obtaining bullion from almost any type of flotation concentrate.

When the cyanide process was first applied on a commercial scale in South Africa, in 1890, the pioneers realized the advantage in the hydrometallurgical treatment of a small tonnage of rich material instead of a large tonnage of low-grade material. The process was then applied to the cyaniding of concentrate, a limitation that persisted only until after demonstration of the practicability of leaching a "huge" charge of 40 tons of tailing, at the Robinson mine. History is being repeated. Concentration of gold ore, with cyaniding of the concentrate, is modern practice—a resuscitation of method for which the simplicity and efficacy of the flotation process and the large capacity of flotation machines are mainly responsible.

Between the introduction of cyaniding and adoption of flotation for precious-metal ores much fluctuation has been noticeable in metallurgical practice, particularly in the Americas. Large-scale leaching operations, on dry unclassified ore and on separated wet sand, met with technical and economic success in the early days. Diminution of payable reserves of pervious oxidized material on properties where bulk leaching was being practiced led to discontinuance of the method, adopted more than a decade later by copper mining companies, one of which has recently revived its application to gold ores. Unwise duplication of other cyaniding methods eventually caused abandonment of trends. Double treatment of sand and slime, for instance, as practiced in South Africa, was adopted for use at the first silver-ore cyanide plant to be erected in Mexico, despite the greater bulk of metal to be recovered and despite the fact that it occurred mostly as the sulphide, not as free metal or merely associated with a sulphide.

Necessity for fine grinding most silver ores stimulated the invention and commercial exploitation of continuous-process machines. General extension of application of all-sliming to gold ore followed, and what was referred to as the New Metallurgy was proclaimed in some of the more important gold fields of the world as superior and novel, forgetful of the fact that at the first commercial cyanide plant in the world, erected at Karangahake, New Zealand, in 1889, all-sliming was practiced. The latter-day enthusiasts, however, insisted that coarse gold could be pulverized and flattened during milling in cyanide solution, eventually dissolved; but they seldom realized or paid heed to the fact that the gold solution resulting was then distributed among a vast number of minute particles of slime and slimed gangue, lessening the recovery of solution by mechanical displacement or causing avoidable residue losses as a result of surface-tension influences. Similarly, today, some flotation enthusiasts insist or infer, because free-milling gold ore has been successfully floated, that the flotation process is suitable for almost all gold ores. Flotation, like sliming in cyanide solution, has been applied in many instances in which it is economically or metallurgically unsuited.

Research and Low-Grade Ore Treatment

Success in the exploitation of low-grade copper ores was only possible after adequate attention had been paid to research and the development of special schemes of treatment, economical of labor and materials as well as technically adequate. Specialists were engaged for this preliminary work, and the provision of ample funds proved a wise and profitable investment. In addition, a large tonnage of ore was developed before operations were begun, providing representative samples and valuable information.

Only in rare instances has development of a low-grade gold-ore deposit been given a comprehensive and impartial study in similar fashion. The best advice on the metallurgy of gold is considered to be available at no cost. Technical erudition is indicated when the general practitioner interested in the exploitation of a gold mine is conversant with the latest trend in the use of patented apparatus. Bewildered by apparent want of agreement among operators in regard to preferred technical methods, confused by the similarity of "extraction" results after experiments with dissimilar processes and apparatus, he takes refuge in being modern in his preferences.

Almost all gold ores have peculiar and individual characteristics, even as have copper ores. Impartial disclosure of essential data is necessary before decision is possible as to what metallurgical research should be conducted. Success in the development of a process is not entirely dependent on the selection of any known scheme or schemes of treatment The work of deciding whether an ore is amenable to amalgamation, cyanidation, or concentration, or to any two, or to all three, may be deputed to a student, surrounded by every purchaseable aid to routine testing; but rarely is an ore so simple in its physical and chemical characteristics that special investigation work and expert suggestion are superfluous. Such investigation demands knowledge of mechanical, physical, chemical and economic fundamentals; experience in the behavior of animate as well as inanimate matter under changing conditions; an understanding of commercial values. Influence of the personal element should not be ignored; I recall an instance where a theoretically perfect mill flowsheet proved impracticable, because of the peculiar type of labor available. Research is likely to be most productive if undertaken by one whose innate technical inquisitiveness and initiative have not been submerged under a mass of easily available data absorbed by study. Almost all the advances in the metallurgy of gold, almost all the disclosures of important fact, have been the outcome of the overtime labors of operating specialists.

Effect of Research and Invention on Metallurgical Progress

Extensive use of the all-slime method of gold-ore treatment, introduced in 1889, was delayed because of the inefficiency or absence of continuous fine grinding, settling, classifying and filtration equipment. Cyanidation of concen-

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* Metallurgical Engineer, Placerville, Calif.

Expansion Of Centralized Milling and Of Tailing Retreatment Operations In The Tri-State Zinc-Lead Mining District

By FRANK J. CUDDEBACK and WM. F. NETZEBAND

Eagle-Picher Ore Train Loading Custom Ore at Mary M. Crystal Mine

THE EXPANSION OF CENTRALIZED MILLING

By FRANK J. CUDDEBACK *

DURING the last five years the expansion of central milling in the Tri-State Zinc-Lead District has been the outstanding progressive development. During the first six months of 1934 central mills produced 50,000 tons of concentrates from mined ore and 14,000 tons from retreatment of old tailings, which amounted to 35 percent of the total output of the district. In view of the many obvious advantages of centralized concentrators for crude ore, and also for coarse tailings, sand and slimes, one might wonder why this development did not take place many years sooner. One must be familiar with the history of mining and milling in this district in order to appreciate more fully the amount of time and number of steps required in the evolution of central milling.

* Mary M. Mining Company.

Historical Sketch

Tradition is one of the most stubborn foes of progress, and in the Tri-State District tradition, in the form of mining leases and methods of mining and milling, has been especially formidable. In both the old and present fields of this district mining has been done under the leasing and royalty system. The most prevalent royalties are 10 and 12½ percent, although the rates range from 7½ to 17½ percent. These leases usually specified that ore from the lease could not be milled over a foreign mill and that foreign ore could not be milled on the tract covered by the lease. Also in many cases the lessors reserved the privilege of taking their royalty in the form of zinc and lead concentrates. Obviously, the two latter mentioned conditions did not lend themselves readily to central milling, particularly in view of the fact that the leases usually continued in force for periods of 10 and 15 years and in some cases for some definite period such as 10 years and "as long thereafter as lead and zinc minerals are found in paying quantities."

In the older Tri-State fields, such as Joplin and Galena, mining and milling were usually done on a very small scale by individual operators. Even the larger tracts were subdivided by subleasing until a large percent of the mining was done on very small leases, many of them about the size of town lots. Mining in the Picher field, even during its early history, was done on a more extensive scale than in the older fields. The orebodies were more difficult to discover, owing to their greater depth and to the lack of surface indications. Obviously, these conditions demanded a greater capital investment for developing sufficient ore reserves to make a feasible operation, which in turn required a larger and more costly plant to enable an adequate return on the investment. However, in spite of the inevitable tendency toward larger operations, only a few of the operating leases covered more than 40 acres and many only 10 and 20 acres. Also each lease, no matter how small, had its own individual concentrating plant, even though the same operating company owned similar leases adjoining or near by.

As the Picher field grew in lateral extent to include outlying acreage with less mineralization, the size of leaseholds increased until 160 and 200 acre tracts were common. Although this was the natural reaction to the lower grade and more widely distributed orebodies, to some extent this change was due also to the gradual substitution of more modern and technical methods for the older inherited practices.

During the years prior to 1929, progress was centered upon the lowering of mining and milling costs and upon the increasing of the efficiency of the small individual mills. Flotation became a recognized success, and beginning in 1923 and 1924, with the advent of improved reagents and successful filters, was widely adopted. Although without doubt, flotation, with the accompanying fine-grinding, desliming and filtering, constituted the greatest change in this period, another important change was

the increase in capacity of the average mill. Prior to the business slump of 1921, relatively low tonnages, 25 to 30 tons per hour, were handled by most of the mills. Thereafter the average capacity per plant was gradually increased to approximately 40 tons per hour. Concentrators handling 60 to 70 tons per hour were not uncommon on some of the larger leases mentioned above.

Typical "Joplin" Mill

A brief flowsheet of a typical Tri-State mill of that period, many of which are still in use, is as follows: The ore, hoisted to the top of a 400-ton mill hopper, is dumped on a flat grizzly with 8 in. or 9 in. spaces, and the oversize broken through by hand labor. The flow of mill heads to a 24-in. jaw crusher is regulated by a crusher feeder. After passing through 36-in. breaker rolls, the mill feed is then elevated to a ½-in. trommel which is in closed circuit with 30-in. return rolls. This minus ½-in. product constitutes the feed for a 6 or 7 cell "rougher jig" which yields three products, clean tailings, middlings (commonly called chats), and an enriched hutch product (locally known as "smittem"). The middlings are ground to ¼ in. and reconcentrated on a "slougher jig" which produces the same three products as the "rougher jig." The tailings are elevated to a tailing pile by either a conveyor or elevator. The hutch product from both jigs is sent to a "cleaner jig" which produces coarse lead and zinc concentrates of commercial grade. The "cleaner jig" tailings and the "slougher jig" middlings are ground in rolls to pass through a 2-mm. trommel screen. This minus 2-mm. material is the feed for several shaking tables which produce clean lead and zinc concentrates, middlings and clean tailings. In some cases the table middlings are ground in a ball mill to approximately minus 65-mesh for flotation feed. In case the mill does not contain a ball mill, the table middlings are returned to the head of the table circuit.

Throughout the mill, usually after each grinding operation, the various mill products are deslimed by means of drags, cones and dewatering boxes. This fine material is flumed to a live-feed drag or several large Joplin-type cones which send the coarser sand to the table circuit and the slimes to the Dorr-type thickener. The flotation feed is pumped from the thickener by a diaphragm pump. The flotation circuit, consisting of three or four Butchart machines, yields lead and zinc products and clean tailings. The flotation concentrates are pumped to a three or four disk American filter which reduces the moisture content to approximately 10 percent.

In 1927 and 1928 several of the larger companies began to centralize their milling operations by what has been called group milling. In this type of operation, one large concentrator, usually of 50 to 70 ton capacity, handled ores from several leases having the same fee ownership. The ore was hauled usually by narrow-gauge gasoline locomotives from these near-by leases for distances seldom exceeding 1 mile. Inasmuch as the different tracts were owned in fee by the same lessors at the same rate of royalty, the ores were not sampled or kept separate by batch milling.

In 1927, the Commerce Mining and Royalty Company considered a central milling plan, designed to handle 4,000 tons per 24 hours and to replace 12 small mills operating 10 hours a day. At that time centralized milling was such an abrupt departure from the accepted practice that the proposed project was rejected temporarily. The difficulties in obtaining a complete revision of a large number of leases and in selling the idea of central milling to a large number of lessors were the principal factors leading to the rejection of this far-sighted plan, but a year later the centralized mill idea was revived and resulted in 1929 and 1930 in the construction and operation of the Bird Dog Mill.

Early in 1929 the Eagle-Picher Mining and Smelting Company successfully milled ore from two adjoining leases over a central mill using what might be called the batch method. One was a

FACTS AND FIGURES ON THE TRI-STATE DISTRICT

THE Tri-State Zinc-Lead Mining District is the largest zinc producing field in the United States, and is also a considerable producer of lead. Its output from 1848 to 1933, inclusive, was over 18,500,000 tons of zinc and lead ores and concentrates valued at $818,000,000, of which the present Oklahoma-Kansas field produced over $400,000,000 since 1915.

The district has been through a period of severe economic stress during the past five years, which is indicated by the following figures:

Year	Shipments Combined Zinc and Lead Concentrates Tons	Gross Value	Average Base Price Per Ton Concentrates Zinc	Average Base Price Per Ton Concentrates Lead	Average Number Mills Operating
1929	712,935	$34,864,645	$42.42	$88.59	114
1930	491,160	17,229,464	31.98	65.16	72
1931	259,395	6,472,720	22.69	44.59	36
1932	205,005	4,058,921	17.63	34.80	15
1933	292,713	8,530,561	26.90	46.79	21
First half 1934	184,502	4,893,697	26.12	41.59	52

PROPORPORTION OF TOTAL UNITED STATES MINE PRODUCTION RECOVERABLE METAL FROM:

	Tri-State District Zinc	Tri-State District Lead	Other Central States Zinc	Western States Zinc	Eastern States Zinc
1929	42.7%	11.3%	2.8%	33.2%	21.3%
1930	36.4	6.8	2.9	32.5	28.2
1931	29.2	5.3	2.6	30.0	38.2
1932	31.5	5.0	2.6	24.6	41.3
1933	35.4	9.8	2.1	29.9	32.6

Obviously, there has been appreciable business improvement since 1932, but there has had to be a great deal of readjustment to meet changed conditions and to try to maintain operations and as much employment as possible in the face of greatly restricted demand and much lower prices for the products of the district.

Outstanding developments of importance and interest accompanying this readjustment are the expansion of centralized milling and of the retreatment of old tailings. The largest concentrator in the field, the Central Mill of the Eagle-Picher Mining and Smelting Company, was built and placed in operation in 1932 when the district was at its lowest ebb, and since has operated almost continuously. This mill and its predecessor in centralized milling—the Bird Dog Concentrator of the Commerce Mining and Royalty Company—have set the precedent for a movement that unquestionably will continue to develop and have an important bearing on the future of the district.

Retreatment of tailings, which during the first half of 1934 has been responsible for over 20 percent of the zinc concentrate production of the district, is an important development which, of course, is distinctly limited as to its further scope.

The accompanying discussions of Centralized Milling and of Tailings Retreatment have been prepared by two young mining engineers who have been engaged in work in the district for some years and are well acquainted with its practices. Mr. Frank Cuddeback is associated with the Mary M. Mining Company, and Mr. Wm. F. Netzeband is now statistician and engineer with the Tri-State Zinc and Lead Ore Producers Association.

M. D. Harbaugh, *Secretary,*
Tri-State Zinc and Lead Ore Producers Association.

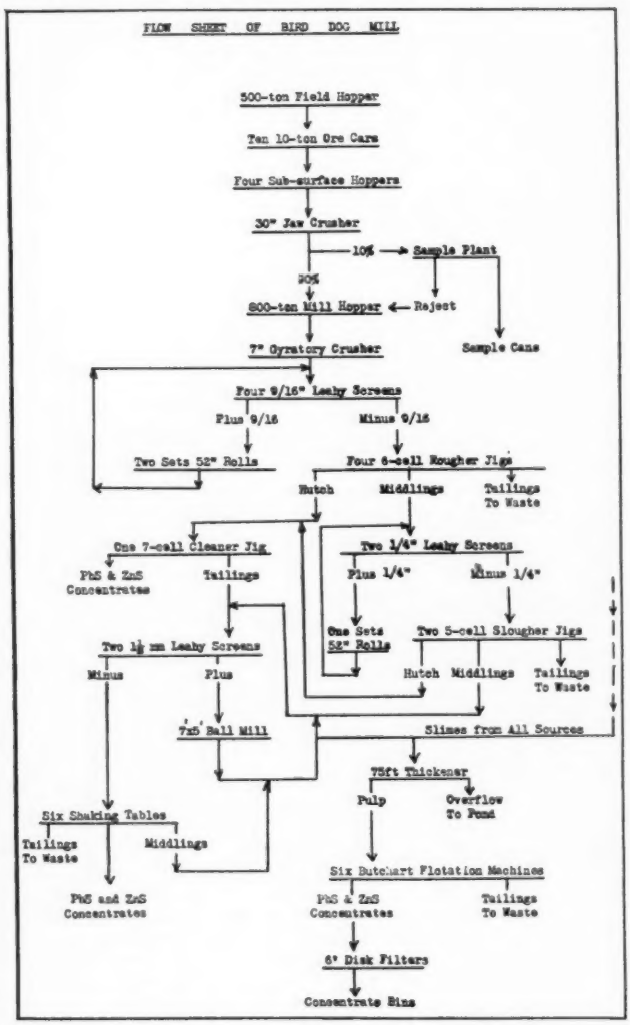
lease of restricted Indian land under the administration of the local Federal Indian Agency, hence special permission for the joint milling was necessary. Ore from the lease on which the mill was located was run during the day and the other at night. By cleaning the mill hopper between batches and storing the concentrates separately adequate segregation was accomplished. This operation was an important step in the evolution of central milling.

Bird Dog Mill

Later, in July, 1929, the Commerce Mining and Royalty Company began construction of the Bird Dog central mill, above referred to, which was completed in June, 1930. This plant was originally designed to concentrate ores from three adjoining allotments of restricted Indian land, totaling 520 acres. New leases which permitted milling at a central concentrator were approved by the Interior Department after consideration of the sampling system and methods of calculating the royalties due to lessors on each tract.

Ore is hauled from the various steel field hoppers over a 42-in. gauge railroad system. The train consists of ten 10-ton Sandford-Day automatic drop-bottom cars and a 14-ton Whitcomb gasoline locomotive. The cars of ore are automatically weighed and recorded at the mine office just before they reach the four 200-ton subsurface hoppers. Ore from any tract is dumped by an automatic tripping device into the hopper designated for that particular tract. From the subsurface hoppers the path of the ore may be followed in the accompanying flowsheet.

In devising a satisfactory method of royalty settlement, it was necessary for the Commerce Mining and Royalty Company to pioneer in the calculation of the correct amount of zinc and lead concentrates produced from each tract. The information used in this calculation consists of accurate weight of ore from each allotment, adequate sampling for determining the moisture as well as lead and zinc content of the crude ore and mill tails, and the amount of finished concentrates produced. The theoretical recovery of zinc and lead which may be calculated from the dry weight of crude ore and the assays of mill heads and tails can then be used to establish the proper proportion of zinc and lead concentrates produced from each tract.



In addition to pioneering in large-scale central milling, the Bird Dog was an outstanding achievement in design construction and metallurgical results. The fact that there has been no major metallurgical or mechanical change in this mill since its construction is sufficient evidence within itself as to the technical and practical knowledge applied in its design. The plant was originally designed to treat 100 tons per hour, but in actual operation has been able to handle 50 percent more than its intended capacity. For several years only ore from four different tracts were concentrated by this mill. During this period the Bird Dog mill might properly have been called a limited-group central mill.

Eagle-Picher Central Mill

Early in 1932 the Eagle-Picher Mining and Smelting Company began the construction of a central mill initially designed to handle 150 tons per hour on a 24-hour basis, but subsequently handling over 200 tons per hour. Even though central milling had proven itself in the Picher field, a great deal of foresight and confidence in the future of this field was demonstrated by the expenditure of nearly a million dollars for a concentrator to replace 18 smaller individual mills. This project was undertaken in the face of the darkest days of the economic depression and of the fact that for a much smaller initial outlay of capital these 18 old mills could have been rehabilitated, one by one as needed, to serve their respective mines and improved sufficiently to produce somewhat better metallurgical results than those with which the district in general had been satisfied heretofore.

This mill was completely and immediately put in operation in October, 1932. Without question, the design, construction and successful operation of this plant was the most outstanding of all the steps in the evolution of central milling in the Tri-State District. The sampling and settlement procedure is sufficiently adequate that both company-mined and custom ores from a large number of mines, totaling approximately 5,000 tons per day, may be handled after sampling without segregation of ore and concentrates. Hence, in addition to being the largest in capacity, the scope of this plant is much broader for both central and custom milling than any of the other centralized milling projects.

Ores from the widely scattered mines which are served by the Eagle-Picher mill are stored in field hoppers of 350 to 450 tons capacity. The ore is transported from the field hoppers to the central mill by a train of 12 standard gauge side-dump cars of 40 tons capacity. The network of existing lines of the Frisco and the Northeast Oklahoma Railroads, over which trackage rights were obtained, influenced the selection of this method of haulage. The maximum haul from any present operation is about 10 miles. However, the company is preparing to ship ores by standard bottom-dump cars from mines in the Missouri part of the district as far away as Wentworth, Mo., some 65 miles by rail.

In view of the fact that the feasibility and success of this central milling project hinged directly upon the accuracy of ore-segregation, ore-sampling and settlement, a somewhat more detailed account of these phases is given herewith. A very unique, as well as satisfactory, method of control was worked out in order to permit a simple, and yet foolproof, segregation of each unit of ore until adequate samples are taken. This phase of the Central Mill alone, if treated with sufficient detail, could furnish ample material for a separate paper, as could also the method of settlement used by the company in connection with this plant.

As the train is dispatched to a designated field hopper, a history card, numbered serially, is assigned to that particular trainload of ore. As the train returns and moves slowly across the scales, the net weight of the ore cars are stamped automatically on the history card. By means of signal lights, the trainload of ore is directed by the weighman over the proper set of tracks from which only the hopper designated on the history card can be reached by the side-dump cars.

By means of an electric interlocking system, designed to prevent a shipment of ore from being handled incorrectly, the weighman maintains complete control over the movement of each batch of ore through the primary crushing and sampling plants. Also, by means of signal lights which appear on the control panel, the weighman is apprised of the movements made by the crushing and sampling plant operators. Thus, it is possible for the weighman to show an accurate record for each batch shipment of ore on its respective history card. The history side of this card, when completed, shows the following information: (1) serial number, (2) primary hopper number (which is also the corresponding sample hopper number), (3) symbol letter (punched at the field hopper by conductor of train), (4) name of mine and operating company, (5) date dispatched (date, hour and minute stamped by weighman with recording clock), (6) date train is weighed, (7) net weight of each carload and total net weight of trainload, (8) date crushed, (9) date sampled, (10) signature of weighman.

The history card is then sent to the general office, where the reverse or settlement side of the card is filled out. All of the settlement data and calculations pertaining to each shipment of ore are shown on this card. The following data are used: (1) wet weight of ore, (2) percent moisture in ore, (3) zinc and lead content of mill heads, tailings and concentrates, and (4) base price of zinc and lead concentrates. From these data the weights of lead and zinc concentrates are calculated by means of a complicated and theoretically accurate formula. An ingenious device consisting of cut-out cardboard charts movable over each other is used which converts a laborious algebraic calculation into a routine procedure of addition, subtraction and multiplication with a calculating machine. The calculated weights of concentrates and current base prices for lead and zinc concentrates are then used to obtain the net values which are used for all settlements.

Considering the magnitude of this milling project, surprisingly few major changes in equipment and metallurgical procedure have been necessary. The accompanying flowsheet gives a much better picture of this mill than could be shown by a detailed discussion.

More Recent Developments

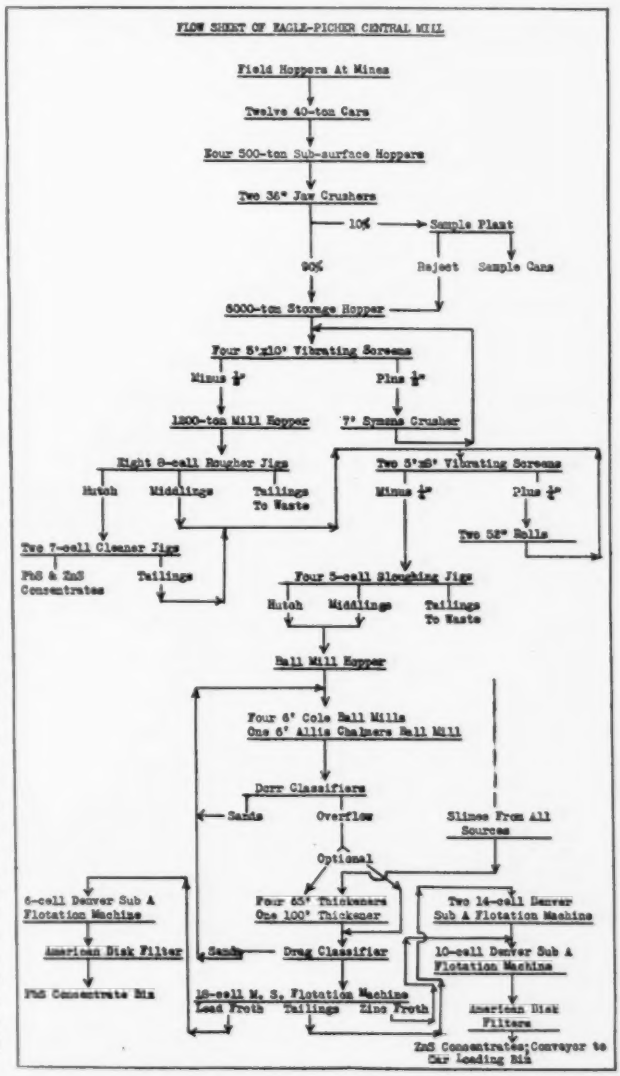
After the completion of the Eagle-Picher Central Mill and with the increase in concentrate prices in 1933, small scale central and custom milling developed rapidly throughout the district. Many of these concentrators are central plants which are retreating coarse tailings, sands and slimes. Very little retreatment by custom milling has been done. Operators soon realized that the advantages found in centralized milling of crude ores were also applicable to retreatment projects. As a result, the number of centralized retreatment plants now approximately equals the number of central ore concentrators. These retreatment plants range from small, crudely constructed open-air mills having a capacity of a few tons per hour to large, up-to-date mills of 70 tons per hour capacity. They are described by Mr. Netzeband in the second part of this article.

All of the small-scale central plants operate under the batch-method of milling. One of the largest of these is the Beck custom mill owned by the Mary M. Mining Company. This is merely a typical 40-ton Tri-State mill converted into a central plant of about 60 to 70 tons per hour capacity. It is being operated as both a central and custom mill, inasmuch as ores from three company-operated mines as well as several custom ores are being handled. Ore is hauled to this mill from field hoppers for a distance ranging up to five miles in bottom-dump semi-trailers carrying about 9 tons. The ore is dumped from trailers into a 30-ton subsurface hopper and is then elevated to the two-compartment mill hopper by means of an inclined tram and 1½-ton tram car. The procedure of handling the different batches of ore consists mainly of preserving the identity of each batch by a thorough clean-up of ore bins and concentrates throughout the mill and by having sufficient concentrate bins to store all concentrates separately until shipped.

In many instances in which ore from small scale underground gouges and clean-ups are hauled to a central mill, the ore is hoisted to the surface and merely dumped on the ground from where it is shoveled by hand into small 2- to 3-ton dump trucks. This expensive procedure is usually a temporary expediency used until a hopper can be constructed or until the extent of ore reserves can be determined. This situation is mentioned principally because it illustrates how rapidly centralized milling is being adopted.

Conclusion

The central concentrators of the Tri-State District may be classed into three general groups, namely: (1) central mills in which no custom milling is attempted, (2) custom mills, (3) combination central and custom mills. The Bird Dog and most of the central retreatment plants belong in the first group. Some of the smaller plants are being operated as strictly custom mills. The Eagle-Picher Central Mill and the Mary M. Beck Mill are combination central and custom concentrators in view of the fact



Bird Dog Central Mill of Commerce Mining and Royalty Co.

that they mill ores from their own mines as well as custom ores. Also, the central plants of the field may be divided into two classes according to milling practice, namely: (1) mills in which the ore shipments are carefully segregated until weighed and sampled but subsequently lose their identity completely, and (2) mills in which the identity of each ore shipment is preserved throughout the entire milling procedure, so that the concentrates may be sold separately. The Bird Dog and Eagle-Picher Central Mill are the only plants belonging in the first group, while all of the other central plants in the district belong in the second group.

The principal advantages of a central milling plant, given in April, 1932, by Mr. R. J. Stroup in a paper describing the "Eagle-Picher Central Milling Project" were so well summarized that his outline is quoted herewith:

1. Better recovery because of:
   (a) Better equipment.
   (b) Continuous operation.
   (c) Uniform feed, as to quantity, character and grade.
   (d) Better supervision possible than at a large number of units.
2. Lower milling costs because of:
   (a) Greater tonnage per man-shift.
   (b) Lower power costs, owing to less connected load and continuous operation.
   (c) Lower cost of repairs and supplies due to better design, construction and equipment.
3. Better control of grade of concentrates produced.
4. Elimination of duplication in costs that are incidental to a multiplicity of operations.
   (a) Reduction of overhead, watchmen, insurance and taxes.
5. Smaller investment than for the combined individual units it replaces.

One of the greatest advantages of centralized milling lies in the fact that it eliminates much of the financial hazard of mine operation. In this day of low prices for zinc and lead concentrates, a fairly small margin of profit must be expected, even with selective mining and economical operation. Hence, many of the present mining operations would be extremely hazardous if not impossible financial ventures if they were expected to repay the cost of an individual mill in addition to the cost of putting the mine in operation. Selective mining is more possible under centralized operation. It frequently happened under the old practice of one-mill-per-mine that the tonage mined each day was maintained to the mill capacity regardless of the mineral content of the ore. The central mill does not depend upon any one mine for continuous full capacity operation, hence the tonnage may fluctuate in order to maintain a profitable grade of ore without an increase in milling cost per ton of ore.

Decidedly better metalurgical results are being obtained by the Eagle-Picher Central Mill and the Bird Dog Mill than were possible by the smaller individual mills. This improvement is not apparent until one realizes the unreliability of the results commonly supposed to have been obtained by the small mills. Grab samples of the various mill products were taken at irregular intervals, often by the man operating the concentrating equipment. Subsequent retreatment of tailings has shown that their average zinc content is at least 1 percent greater than that shown by the average mill tailings assays. The accurate samples mechanically taken at regular intervals at the new central mills permit an authentic picture of their metallurgical efficiency.

Without question, centralized milling is strengthening the economic position of the Tri-State District in the mining industry of the country. It permits more flexibility in adjustment of production to demand, to the advantage of everyone concerned. It is having an important bearing upon the increased reemployment of labor, for despite the increase in tonnage milled per man employed, this elimination of labor is negligible compared to the increased employment in mines which would not be operating except for centralized milling. Also, this practice will contribute much to enhancing the life of the field by permitting the mining of many small orebodies and the cleaning up of old mines that would not warrant rehabilitating an old mill or building a new one.

The next few years are certain to witness the further spread of centralized milling.

EXPANSION OF TAILINGS RETREATMENT OPERATIONS IN THE TRI-STATE DISTRICTS

By WM. F. NETZEBAND *

Factors Governing Retreatment of Tailings

THE successful retreatment of tailings was first made possible by the fact that all the early tailings were put upon the piles without the benefit of the flotation process in cleaning the finer sizes of the ore. Many of the sand and slime ponds contained values up to 15 percent and 20 percent blende, which were not recoverable by any commercially practical method at the time the ores were milled. It was these ponds and sand piles that were first attacked when flotation proved successful in cleaning Tri-State ores. Many companies did not deslime their tailings and also mixed the tailings from the table unit with those from the jig unit. Many of the tailings contained values up to four percent blende due to the manner of occurrence of the values in the ores. Some ores were free milling and permitted a good extraction, but others were "chatty," that is, sphalerite was disseminated throughout the jasperoid which cemented the chert fragments to form the jasperoid breccia so characteristic of the Oklahoma-Kansas portion of the Tri-State district. These "chatty" ores resulted in high tailings losses, for the values could be freed only by grinding to finer sizes than the tables could efficiently concentrate, and therefore no attempt was made to save them.

A factor that has permitted putting upon the pile tailings that were good enough to retreat, was the crude methods in use in sampling tailings. All sampling was done by hand, in many cases by the man operating the mill or particular machine which was being studied. This permitted the operator to regulate his machine so that it would give the most satisfactory tailings about the time the sample was taken. Comparison of samples taken from tailings piles with those made at the time the tailings were put out show wide discrepancies, the original samples being in some cases nearly 50 percent too low.

After the richer slime ponds and sand piles were retreated, operators interested in retreating tailings began to study the possibility of retreating the coarser tailings piles, especially those in which the table tailings were mixed with the jig tailings. The problem that confronted these early operators was to eliminate as many as possible of the coarser tailings at the least expense. Simple screening with trommel or vibrating screen was satisfactory as far as it went, but it was soon evident that there were values in the "chats," and if coarser tailings had to be handled it would be best to recover all values possible. This phase of the problem brought into use the rougher jig used in mills handling crude ore. Properly regulated, the rougher jig will act as a screening device, and at the same time the rich "chats" can be drawn off the beds by means of suitably devised "chatters." The development of the jig to perform these two operations successfully has made possible the working of tailings piles of low grade, and is responsible as much as flotation for the rapid expansion of tailings retreatment in the last few years.

Loading Equipment of Tailings Retreatment Operation Cardin Mining and Milling Co.

General Flow Sheet

There were over 20 tailings mills operating during the spring and early summer before the drought forced many of them to close due to lack of water. The flow sheets in these mills are essentially the same, although there are many minor differences due to the differences in the character of the ore and to the preferences of the operator.

Practically all of the mills taking tailings from a single pile bring them in by means of a drag line scraper and dump into a hopper. The hopper feeds either directly to the feed elevator or to a belt conveyor, which carries the material into a storage hopper at the mill. Those mills which have adopted the central milling idea use several methods: drag line scraper and hopper with subsequent loading into trucks or tram cars hauled by gasoline locomotive; electric or gasoline powered shovels, usually about ⅜-yard bucket, loading into 10-ton trailer trucks or tram cars with gasoline locomotive. The central mills use essentially the same type of flow sheet as the mill handling tailings from a single pile, the only difference being that more machines are used in order to handle a larger tonnage of material.

Loading Tailings for Ottawa Mill

In some mills the tailings are fed directly to the jigs without further preparation. In others they are run through Cornish rolls and crushed to whatever size that has been determined as most suitable for those particular tailings. Most of the mills treat the tailings at ⅜ inch to ½ inch, but one mill has found it necessary to crush to ⅛ inch before it can successfully clean the tailings.

Rougher or "Sloughing" Jig

After the tailings are crushed to the size which has been found to be best suited to the particular material, they are treated on the rougher jigs in order to eliminate as much barren material as possible. Because these jigs eliminate or "slough off" such large proportions of the barren material, they have become known locally as "sloughing jigs" and this designation is used herein throughout.

As stated earlier in the paper, the "sloughing jig" has a double duty, that of acting as a screen and also of recovering the "chats." The screening action is accomplished by maintaining a light bed and pulling heavily through the sieve cloths into the hutch. The "chats" are recovered from the jig bed through various types of "chatters" or draw-offs. The type most commonly used is a pipe, usually 1½ inches or 2 inches in diameter, having several holes or long slots cut in it and set nearly horizontal just inside the tailboard of the jig cell. This pipe is set at such a distance above the sieve that most of the "chats" of a predetermined specific gravity will find their way into the pipe and be drawn off. Several mills are using

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Typical Modern Field Hopper

what is essentially a modification of the pipe "chatter," but the amount of "chats" drawn off can be regulated by the operator. One mill is using a vertical pipe draw-off set near the tailboard of the cell and another is using the standard gate-and-dam type of "chatter" or draw-off.

Practically all tailings retreatment mills are using the Cooley jig, a modification of the standard Harz jig. Instead of the standard six-cell rougher of the crude ore mill, many of the tailings mill operators are using a slightly modified six-cell jig, feeding it at the center and thus making of it two three-cell jigs. This has been found to provide greater capacity with the same size jig. Several operators have carried this idea farther and have modified the usual six-cell rougher jig so that it acts as six single-cell jigs operating in parallel. It is on these single-cell jigs that the vertical pipe draw-off and the gate-and-dam draw-off are used.

The three-cell jigs, which most of the mills are using, take from 12 to 15 tons of feed per hour and eliminate from 60 percent to 75 percent of the material. The tailings from the "sloughing jigs" are sent directly to the tailings pile, as it is not economically possible to extract any further values. The hutch product and the product from the "chatters" are usually thrown together for further treatment.

Sand Jigs and Tables

The manner of further treatment of the partially concentrated material depends largely upon the size of the mill. In the larger mills the combined hutch and "chatter" products are crushed through high-speed Cornish rolls in closed circuit with a 1½ mm. or 2 mm. screen and the undersize is treated over a sand jig, the sole purpose of which is to further enrich the feed to the tables. The smaller mills usually send the undersize from the high-speed rolls direct to the tables. The tables make three products: a finished concentrate, a middling which is sent to a ball mill, and a tailing which is sent to the tailings pile.

Ball Mill

In mills without tables the undersize from the high-speed rolls are usually deslimed in a belt drag and the coarse material fed to a ball mill in closed circuit with a classifier usually of the Dorr or Aikens type. In mills where tables are used the middling product is deslimed and sent to the ball mill. The classifier overflow size is generally a maximum of 35 mesh (Tyler screen) although most of the feed will pass 65 mesh. This overflow product forms one part of the flotation feed.

Flotation

The feed to the flotation unit is made up of the overflow from the desliming operations in various parts of the circuit, together with the overflow from the classifier in closed circuit with the ball mill. Usually the feed to and the tailings from the "sloughing jig" are deslimed either in cones or drag belt deslimers, and the overflow sent to the Dorr type thickener to prepare it for the flotation circuit. After the first regrinding operation on the hutch and "chatter" products from the "sloughing jig," the screen undersize is deslimed before being sent to the sand jig, tables or ball mill, as the case may be. The overflow from this desliming drag is also sent to the thickener. If more than one regrinding operation is necessary, the undersize from the screen is invariably deslimed and the overflow sent to the thickener.

Two types of flotation machines are in common use in the district (the Butchart and the Denver Sub-A). The number of cells depends upon the tonnage treated and the grade of concentrates to be maintained.

As there is very little recoverable lead left in the tailings piles, the retreatment problem resolves itself into the recovery of the zinc values, which simplifies the flotation operations and cuts down the number of cells necessary to make a finished product. The zinc minerals are usually somewhat oxidized, and unless care is taken in sampling a tailings pile

(*Concluded on page* 53)

Eagle-Picher Central Mill

Accident Experience and Cost in Wyoming Coal Mines*

By D. J. PARKER †

BEFORE the various states began to enact workmen's compensation laws accidents were considered inherent in many industries, and little or no effort was made to prevent or reduce them. The hazard was accepted by the employe with the job, and the avoidance of accidents by mental alertness or physical agility was largely his responsibility. After the employe had given evidence of enough skill in performing his allotted task efficiently the responsibility of the employer apparently ceased with respect to the personal safety of the employe.

However, following the enactment of workmen's compensation laws, at least two facts that had not before been fully appreciated soon became apparent: (1) The majority of accidents can be prevented if the management firmly determines to prevent them; (2) from a monetary point of view alone accidents are decidedly expensive, both to employer and to employe. It is now evident that savings effected by conscientious safety effort add substantially to net profits of operation.

During the last few years industry has realized as never before that the attitude of the public can no longer be ignored in relation to accidents. There is no surer way to crystallize public sentiment in favor of an industry than by an effective, sincere, and honest program for the prevention of accidents, and public sentiment toward an industry or an individual unit of such industry often means success or failure for that particular industry or unit.

Unquestionably the coal-mining industry has suffered in the past from criticism, some of it unjust but largely deserved, as a result of its high accident rates. During the last 2 years, however, the improvement in reduction of accidents has been marked, the best record in the entire history of the industry.

In the early days when satisfactory settlement was not possible following an injury in coal mines litigation was the last resort, and many personal-injury cases were presented before the courts. Because the best legal talent was usually employed by the defendent, the plaintiff or injured workman almost invariably lost the suit, though the cost to the victor was by no means negligible. Even when the plaintiff was successful in his initial effort usually his resources were exhausted long before final decision was handed down by the courts, and the amount received by the successful plaintiff was but a small proportion of the total cost to the defendant. Compensation laws have therefore been a blessing to employer and employe alike. The employer has found it less expensive to make direct payments under schedules of compensation laws for accidents, but of far more importance he has found it much less costly to prevent accidents than to pay for them. The employe is afforded a means of living while incapacitated, or in the event of fatal injury dependents are at least temporarily provided with the necessities of life. The employer has also found that with the exercise of readily available precautions accident occurrence can be greatly curtailed if not entirely eliminated.

The writer expresses his sincere appreciation to the several companies who so generously cooperated in furnishing the data on which this paper is based.

The Wyoming Workmen's Compensation Act and acts relating thereto, with amendments to May 1, 1933, is rather broad in scope; it covers almost every form of occupation, except as herein noted, with no restrictions on the minimum number employed by any one company or concern. The act does not apply to employes engaged in interstate commerce, domestic service, ranching, farming, agriculture, horticulture, or stock raising or to any person holding an appointment as sheriff, deputy sheriff, constable, or deputy constable. All other occupations, including mining and "dude ranching," are classed as "extra hazardous" and fall within the scope of the act.

No compensation for temporary total disability except the expense of medical attention is allowed for the first 7 days of disability unless the incapacity extends beyond the period of 21 days, in which case the compensation runs from the time of the injury. If unmarried the injured workman receives $50 per month; if married he receives not to exceed $90 per month, the amount awarded varying with the number of dependents.

In all cases of temporary total disability, permanent partial disability, and permanent total disability the expenses of medical attention and hospital care of the injured are paid from date of injury, the expense of medical treatment not to exceed $150 in any case and the hospital expenses not to exceed a like sum unless under general arrangement the workman is entitled to medical attention and hospital care or the employer furnishes adequate and proper medical attention and hospital facilities to his employes.

If death results from an injury the expense of burial is paid, not to exceed $150 in any case unless other arrangements have been made between employer and employe.

Compensation for permanent partial disability is expressed in terms of money and not on the basis of days lost, either actual or theoretical. For any permanent partial disability resulting from an injury the workman receives a lump sum as set forth in table 1. Injuries due to "culpabale negligence" on the part of the injured are not compensable.

TABLE 1.—WYOMING COMPENSATION SCHEDULE

Disability	Compensation
Loss of a thumb	$337.50
Loss of a first finger	300.00
Loss of a second finger	225.00
Loss of a third finger	225.00
Loss of a fourth finger	225.00
Loss of a palm (metacarpal bone)	900.00
Loss of a hand	1,500.00
Loss of an arm at or below elbow	1,800.00
Loss of an arm above elbow	2,000.00
Loss of a great toe	200.00
Loss of one toe other than great toe	150.00
Loss of a foot	1,200.00
Loss of a leg below the knee	1,800.00
Loss of an eye or the sight thereof	1,800.00

For permanent total disability $4,000 is paid on a monthly basis, and in case of death $2,000 is allowed, also paid on a monthly basis.

Table 2 gives the lost days charged for permanent injuries. This weighting is used by the United States Bureau of Mines, the National Safety Council, and

* Reprinted from U. S. Bureau of Mines Information Circular 6791.

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many operators in determining and comparing the severity of accidents. By such standardization of weighting the severity of accidents is placed on a comparable basis. If a weighting system were adopted by the operators of the various coal-producing states it would be decidedly advantageous in determining the actual progress being made in accident prevention work.

TABLE 2.—SCALE OF TIME LOSSES FOR WEIGHTING INDUSTRIAL ACCIDENT DISABILITIES TO SHOW SEVERITY OF ACCIDENTS, NATIONAL SAFETY COMPETITION BASIS

Nature of injury	Degree of disability in pct. of perm. total dis.	Days lost
Death	100	6,000
Permanent total disability	100	6,000
Arm above elbow, dismemberment	75	4,500
Arm at or below elbow, dism'b't	60	3,600
Hand, dismemberment	50	3,000
Thumb, permanent disability	10	600
Any one finger, perm. dis	5	300
Two fingers, perm. dis	12½	750
Three fingers, perm. dis	20	1,200
Four fingers, perm. dis	30	1,800
Thumb and 1 finger, perm. dis	20	1,200
Thumb and 2 fingers, perm. dis	25	1,500
Thumb and 3 fingers, perm. dis	33⅓	2,000
Thumb and 4 fingers, perm. dis	40	2,400
Leg above knee, dismemberment	75	4,500
Leg at or below knee, dismemb't	50	3,000
Foot, dismemberment	40	2,400
Great toe or any 2 or more toes, permanent disability	5	300
One toe other than great to, perm. dis.	0	....
One eye, loss of sight	30	1,800
Both eyes, loss of sight	100	6,000
One ear, loss of hearing	10	600
Both ears, loss of hearing	50	3,000

Table 3 shows the ratio of fatalities to coal produced and to man-days worked for all Wyoming coal mines from 1927 to 1932, inclusive. During this 6-year period Wyoming produced 35,231,066 tons of coal, with 111 underground and surface fatalities. The fatality rate per million tons produced was 3.12, which compares favorably with the 1932 record of 3.31 for the entire country. The 1932 rate is one of the lowest fatality rates in the history of coal mining in the United States.

During this period Wyoming mines produced 317,397 tons of coal and worked 48,261 man-days for each fatality. In 1932 there were only 6 fatalities, compared with 14 in 1931, the next best year. The highest number of fatalities (25) during the 6-year period occurred in 1928. The fatality rate per million tons mined for 1932 was 1.43, considerably less than half the rate for the entire country for 1932.

For convenience and to avoid disclosing the identity of individual mines or mining companies the 27 mines have been divided into 9 groups, each designated by letter. These mines represent 37 percent of the average of all mines operating over the 6-year period, and the total tonnage of the 9 groups is 57 percent of the total tonnage produced by the state for the same period. All except 5 of the 27 mines operated for the full 6-year period.

In group *A* 1 mine operated for less than 2 years and another for only 5 months; the other mines of this group operated for the full 6-year period. In group *D* 2 mines operated for less than 6 years, 1 for 3 years and 7 months, and 1 for 5 months. In group *I* 1 mine operated for only 2 years, the only one operating less than 6 years.

TABLE 3.—RATIO OF FATALITIES TO PRODUCTION AND MAN-DAYS WORKED IN ALL WYOMING COAL MINES, 1927-32, INCLUSIVE, ACCORDING TO THE STATE DEPARTMENT OF MINES

Year	Mines operating	Coal produced, tons	Avg. days active	Total employed	Man-days worked	Fatal accidents	Tons per fatality	Man-days per fatality	Fatalities per million tons mined
1927	62	6,738,561	176	5,639	992,464	22	306,298	45,112	3.26
1928	58	6,553,174	216	4,768	1,029,888	25	262,127	41,195	3.81
1929	62	6,699,779	213.5	5,081	1,084,793	21	319,037	51,657	3.13
1930	69	6,070,769	183	4,868	890,844	23	263,946	38,732	3.78
1931	85	5,000,365	154.6	4,675	722,755	14	357,168	51,625	2.80
1932	92	4,168,418	150.2	4,236	636,247	6	694,736	106,041	1.43
Total or averages	...	35,231,066	182.2	29,267	5,356,991	111	317,397	48,261	3.12

Table 4 gives production and accident data for 27 Wyoming coal mines.

The total of 1,779 accidents includes 54 fatalities, 3 total permanent disabilities, 117 partial permanent disabilities, and 1,605 other lost-time accidents.

The "total accidents" column includes all accidents causing the loss of one or more days other than that on which the accident occurred. The average number of accidents per year was 296.5.

Table 4 gives an accurate picture over a 6-year period but does not indicate the progress made in reducing accidents, especially fatalities. For example, in the last 5 groups (*E* to *I*, inclusive) there was only 1 fatal accident in 1932, compared with 12 in 1929. Group *C*, relatively small operations, had no fatal accident during the 6-year period. Group *D* also had no fatal accident in 1932, compared with 3 in 1927, and only 1 for each of the other 4 years.

Table 5 shows accident frequency and severity rates for each group of mines—actual days lost and also days lost according to the schedule of weighing accidents, fatal as well as nonfatal, used in the National Safety Competition conducted annually by the United States Bureau of Mines.

The frequency rate is the ratio of the number of accidents per million man-hours worked and is found thus:

$$\frac{\text{Number of accidents} \times 1{,}000{,}000}{\text{Man-hours worked}} = \text{frequency rate}$$

The severity rate is the ratio of the days lost per 1,000 man-hours worked and is found as follows:

$$\frac{\text{Days lost} \times 1{,}000}{\text{Man-hrs. worked}} = \text{severity rate}$$

The severity rate in table 5 is calculated on the theoretical number of days lost as set forth in the column headed, "Days lost, National Competition basis." The severity rate based on days lost, Wyoming basis, obviously would be much lower.

Because group *C* had no fatal or permanent disability accident during the 6-year period, it had the lowest severity rate (1.47); group *B* had the highest severity rate (36.03) of the nine groups. Group *C* had the lowest frequency rate (44.02) and group *B*, the highest (103.88). Group *B* had the highest frequency and severity rates of the nine groups, possibly because of adverse natural conditions or laxity in supervision.

Attention is directed to the fact that during the 6-year period 1927-32, inclusive, only three total permanent disability accidents occurred.

TABLE 4.—PRODUCTION AND ACCIDENTS IN 27 WYOMING COAL MINES, 1927-32, INCLUSIVE

Group	Total coal produced, tons	Years active	Average employed	Total man-days worked	Total accidents	Days lost *
A	2,193,498	†	332.6	386,020	314	11,009
B	984,244	6	137.3	131,553	109	1,810
C	481,465	6	24.6	48,267	17	568
D	1,552,507	†	131.6	354,037	137	6,003
E	4,731,628	6	225.5	649,487	385	16,146
F	1,758,754	6	184	238,128	142	7,728
G	2,309,525	6	210	315,296	202	8,479
H	3,586,385	6	122.6	489,268	285	12,846
I	2,859,326	2 to 6	66.6	263,827	188	4,829
Total	20,457,332				1,779	69,418

* Contains no charge for fatal or total disability accidents.
† Five months to six years.

TABLE 5.—ACCIDENT FREQUENCY AND SEVERITY RATES IN 27 WYOMING COAL MINES, 1927-32, INCLUSIVE

Group	Fatalities	Total perm. dis.	Partial perm. dis.	Other lost-time accidents	Days lost, Wyoming basis	Days lost, natl. competition basis	Total man-hours worked	Frequency rate	Severity rate
A	7	1	16	290	11,009	59,009	3,088,160	101.67	19.11
B	5	1	9	94	1,810	37,810	1,049,244	103.88	36.03
C	0	0	1	16	568	568	386,136	44.02	1.47
D	7	0	6	124	6,003	48,003	2,832,296	48.37	16.94
E	10	1	21	353	16,146	82,146	5,195,896	74.09	15.81
F	2	0	9	131	7,728	19,728	1,905,024	74.53	10.35
G	6	0	22	174	8,479	44,479	2,522,368	80.08	17.63
H	9	0	26	250	12,846	66,846	3,919,144	72.71	17.05
I	8	0	7	173	4,829	52,829	2,110,616	89.07	25.03

Table 6 classifies the accidents that occurred during the 6-year period according to nature and cause, with segregation of surface and underground accidents.

Thirty-three of the 54 fatalities were caused by falls of roof or coal and 11 by haulage; the latter is surpassed only by falls of roof or coal as a cause of accidents, although responsible for almost as many partial disability and other lost-time accidents. Only one fatality occurred on the surface, and this was due to electricity. Flying rock or coal was responsible for 1 fatality and 97 lost-time accidents.

Underground machinery other than mining machines caused 1 fatality and 122 lost-time accidents. Most of the mines are highly mechanized; mechanization probably accounts for the large number of lost-time accidents. Handling of material underground was responsible for 110 lost-time accidents and falls of persons underground, 121 accidents; the latter may indicate poor illumination, defective vision, or poor "housekeeping," coupled with inadequate supervision.

Handling material, machinery, miscellaneous causes, falls of persons, and haulage ranked in the order given as causes of accidents. An analysis of table 6 clearly indicates the points of greatest hazard and the necessity for increased supervision and education.

In an effort to determine the monetary cost of accidents it is generally assumed that such expense is divided into two classes, direct and indirect. In the final analysis, however, loss of life, or total disability and the suffering due to accidents cannot be evaluated in terms of money. Direct cost covers compensation paid to injured workmen, medical attention, and hospitalization; indirect or hidden cost, with which industry is not particularly familiar, includes loss of wages to the injured not covered by compensation, time lost by other employes, damage to equipment, loss of production, overhead expense, lowering of morale, and temporary demoralization as well as numerous others. An eminent authority on accident prevention work has estimated that the indirect or hidden cost is at least four times that of the direct cost.

Table 7 gives for the 9 groups of mines the cost per ton on a total direct-cost basis, which ranges from 0.76 to 6.53 cents per ton and averages 2.37 cents.

Five of the nine groups charge ½ cent per ton for "medical-hospital administration"; the actual figures are available for 2 other groups. The charge for the 2 remaining groups, for which accurate data on medical and hospitalization costs were not available, was arbitrarily assumed to be the same as used by the five groups, ½ cent per ton. This figure, although manifestly not accurate for these two groups, is believed to be close enough to complete the picture without vitiating to any considerable extent the accuracy of the data.

TABLE 6.—CAUSES OF ACCIDENTS IN 27 WYOMING COAL MINES, 1927-32, INCLUSIVE

Cause	Fatalities	Total disabilities	Partial disabilities	Other lost-time accidents	Total lost-time accidents
Underground:					
Falls of roof or coal	33	3	28	384	448
Flying coal or rock	1	0	14	82	97
Haulage	11	0	26	351	388
Electricity	1	0	4	26	31
Mining machines	1	0	8	42	51
Gas ignitions	1	0	3	2	6
Machinery	1	0	5	116	122
Explosives	2	0	0	5	7
Handling material	0	0	7	103	110
Tools	0	0	5	83	88
Falls of person	0	0	2	119	121
Nails	0	0	0	5	5
Miscellaneous	2	0	2	149	153
Surface:					
Haulage	0	0	0	21	21
Railroad cars	0	0	0	6	6
Machinery	0	0	4	19	23
Handling materials	0	0	3	29	32
Falls of person	0	0	4	22	26
Tools	0	0	0	13	13
Electricity	1	0	1	2	4
Miscellaneous	0	0	1	26	27

TABLE 7.—ACCIDENT COST AT 27 WYOMING COAL MINES, 1927-32, INCLUSIVE

Group	Coal produced, tons	Cost of medical-hospital administration	Compensation awarded	Total direct cost	Direct cost per ton, cents
A	2,193,498	$10,967.49	$46,280.25	$57,247.74	2.61
B	984,244	31,649.00	32,640.00	64,289.00	6.53
C	481,465	2,407.33	1,278.72	3,686.05	.76
D	1,552,507	2,619.96	28,081.65	30,701.61	1.97
E	4,731,628	23,658.24	76,231.57	99,889.81	2.11
F	1,758,754	8,793.77	25,637.77	34,431.54	1.95
G	2,309,525	11,547.63	44,617.52	56,165.15	2.43
H	3,586,385	17,931.93	59,826.72	77,758.65	2.16
I	2,859,326	14,296.63	48,201.25	62,497.88	2.18

The total direct accident cost for the 6-year period for all groups was $486,667.43. If the ratio of direct to indirect cost is assumed to be 1:4, the grand-total cost of accidents in the 27 mines would be $2,433,337.15, or 11.89 cents per ton. While this is excessively high it should be remembered that accidents cost much more than money; hence prevention of accidents is very much worth while and certainly cannot be considered useless.

Table 8 summarizes the accident experience of all groups combined. It is believed that this record will compare favorably with that of many of the coal-producing states in the United States and perhaps is equal to or better than that of most of the western states. As might be expected, some of the mines covered by the nine groups had much better accident records than others. Combining the statistics for all groups, as in table 8, gives a comprehensive picture of the situation for these properties scattered through the entire state.

TABLE 8.—SUMMARY OF ACCIDENT DATA FOR 27 WYOMING COAL MINES, 1927-32, INCLUSIVE

Number of mines		27
Coal produced	tons	20,457,332
Man-days worked		2,875,883
Fatal accidents		54
Total permanent disabilities		3
Partial permanent disabilities		117
Temporary disabilities		1,605
Total lost-time accidents		1,779
Total time lost (National Competition basis)	days	411,418
Time lost per accident	do	231.12
Accidents per fatality		32.9
Coal produced per accident	tons	11,505.8
Coal produced per day lost	do	49.7
Direct accident cost	cents per ton	2.37
Frequency	rate	77.31
Severity	do	17.88

Although it is recognized that substantial progress is being made in the prevention of accidents in the coal mines of Wyoming, obviously from this record there is much room for improvement. As evidence of progress, one company with unusual enterprise, energy, and persistence had the eyes of every workman examined and quartz glass goggles ground to prescription for each individual; the cost of examination and goggles was borne entirely by the company. As a result of the enforcement of an inflexible rule, goggles are worn by all employes, and there has not been an eye injury underground or on the surface since April, 1933.

Another concrete example of progress is the offer by one company (whose experience is included in this paper) of substantial rewards for meritorious accident records in which the workmen as well as the foremen have an opportunity to participate. Largely through such means this company now enjoys the lowest accident experience in its entire history.

Doubtless many good accident records are achieved without a bonus or other special recognition, but it would appear that some added incentive over and above the daily wage is likely to give increased stimulus to greater safety, with resultant numerous benefits to both employer and employe.

It is confidently believed that with unremitting effort, effective inspection, close supervision, rigid discipline, and safety education of the workers accidents can be greatly reduced in the coal mines of Wyoming.

Mining Anthracite Without Roof-Fall Accidents†

By R. D. CURRIE *

FALLS OF ROOF have long been the major cause of mine accidents, including fatalities, in both anthracite and bituminous coal mines of the United States, as well as in coal and metal mines all over the world. In 1932 the Pennsylvania Department of Mines began a concentrated drive to prevent such accidents; through the untiring efforts of most of the anthracite operators and officials, this drive is now showing remarkable results in a lower accident rate from this cause.

One of the most unusual records is that of the Colonial Colliery, Colonial Colliery Company, an anthracite mine and preparation plant at Natalie, Northumberland County, Pa., operated by Madeira, Hill & Company, with main office at 260 South Broad Street, Philadelphia, Pa.

Mining conditions at Colonial Colliery are typical of the Western Middle coal field of the Pennsylvania anthracite region. The mine is opened by three shafts and three surface slopes, in addition to five underground slopes. The 11 veins of coal being mined range from 2.5 to 5 ft. in thickness, and the pitch ranges from flat to 65°. The roof overlying the coal is characteristic of coal mines in this region and varies from massive conglomerate to more or less disintegrated shale. The cover ranges from essentially nothing at the outcrop to 500 ft.

The mining methods employed cover the entire range of common operating practices in the region, including longwall, room-and-pillar, buggy breasts, sheet-iron chutes, empty or open chutes on batteries, full chutes or breasts, mechanical shaker chutes, and scraper loaders. The general practice is to carry breasts 24 ft. wide on 50-ft. centers, although in certain sections breasts are carried 25 ft. wide on 30-ft. centers.

Longwall mining has been done on an extensive scale; and large areas have been completely mined, using faces or walls 250 to 400 ft. long. This method, using Sullivan-type undercutting machines with scraper loaders, has been very successful in the flat portion of the mine.

During 1933, 50.4 percent of the total tonnage came from pillar extraction, and about 40 percent of the total production was loaded by mechanical units. The active workings comprise 278 faces, of which 22 are advancing gangways.

The Colonial Colliery is highly mechanized and uses electric power extensively in mining, loading, and transportation. The following mechanical equipment is used in these three operations: 27 scraper loaders, 61 shaker chutes, 13 storage-battery locomotives, 17 trolley locomotives (7 to 15 tons), 3 outside steam locomotives, 2 outside rock lorries, 1,150 mine cars (steel except 140 wood and steel cars), 4 undercutting machines, and 97 pneumatic drills. Forty miles (2.5 miles on the surface) of track are in use. Mules haul over about 10 miles of track, especially in gathering cars in isolated sections, or for short distances.

Parts of the mine considered gassy are worked with closed lights; when this report was written 847 Edison Models F and H permissible electric cap lamps were in use by 83 percent of the underground employes.

The mine is ventilated on a split system, using six electrically driven fans as shown in table 1.

TABLE 1.—VENTILATING FANS

Size, feet	Capacity, cu. ft. per min.
5 x 12	100,000
4 x 6	89,000
3 x 1¾	30,000
4 x 8	35,000
6 x 18	80,000

All ventilating fans are equipped with automatic panels; two are reversible and equipped with explosion doors. Five automatic-type mine doors are used in controlling the ventilation to parts of the mine—two electrically and three mechanically operated.

In a recent study of the return airways of the mine the samples collected by the writer and analyzed by the gas laboratory of the United States Bureau of Mines indicate that approximately 45,690 cu. ft. of methane are carried out of the mine every 24 hours. Although this is not a large quantity of methane for a mine of this size (gas has never been found in over half of the mine sections), nevertheless it is enough to keep the officials on the alert for dangers from this source.

Supervision

Underground supervision of workmen and working places plays a large part in any accident-prevention program. While educational methods are stressed and personal responsibility is impressed upon every employe, supervision is carefully maintained at the Colonial Colliery, as shown in table 2.

TABLE 2.—SUPERVISORS AT COLONIAL COLLIERY

Inside and outside:
- 1 superintendent.
- 1 assistant superintendent.

Outside:
- 1 outside foreman.
- 1 breaker foreman.
- 1 electrical foreman.
- 1 carpenter foreman.
- 1 night foreman.
- 1 head machinist.
- 1 night machinist boss.

Inside:
- 1 general mine foreman.
- 8 mine foremen.
- 4 assistant mine foremen.
- 14 preshift examination men.
- 1 topping boss.
- 1 transportation or bottom boss.

An average of 584 face men and 305 inside company day men (a total of 889) was employed underground during 1933; the outside force included 63 breaker employes and 115 outside company men, a grand total of approximately 1,067 persons employed.

In general, each working place is visited by a fire boss before the men enter the workings and once during the shift by the foreman in charge, although in certain sections of the mine two visits are made during the shift by the foreman in charge.

The vibration method of roof testing is used. The tips of the fingers are placed against the roof and the adjacent roof is struck with a drill or bar; any vibration felt at the finger tips indicates an unsound roof. This method of testing, in conjunction with the "sound" of the roof, is more dependable than relying upon the "drummy" sound alone.

A general practice in this mine is to have the miner stop his work whenever an official enters the working place and test the roof, reporting to the official the condition of the roof just tested. This is an excellent means of training the men in the correct roof-testing method if followed by proper instructions when improper methods are observed.

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Although no definite, standardized method of timbering is employed at this colliery, several methods are used that seem to fill the specific needs of the varying conditions encountered. Timbering instructions are given verbally at the discretion of the immediate supervisory official. Table 3 shows the quantity of timber used at Colonial Colliery in 1932. The vast quantity of timber used in this mine undoubtedly accounts in large measure for the excellent safety record from falls of roof.

TABLE 3.—TIMBER USED AT COLONIAL COLLIERY IN 1932

Size, inches	Linear ft.
3	58,266
4	69,468
5	141,165
6	169,583
7	115,241
8	59,028
9	30,789
10	27,939
11	14,873
12	12,546
13	5,313
14	3,115
15	1,300

The safety organization at this colliery is centered around a general safety committee composed of the general manager, general superintendent, mine superintendent, department heads, and safety engineer, which meets monthly to study and discuss accident prevention. The accident reports of the investigating committee are read and discussed, and the responsibility for each accident is placed by the general manager.

A second group, which plays an important part in the accident-prevention program, is the mine staff, which meets monthly to discuss accident-prevention and operating problems.

A third group, the mine safety committee, which functions exclusively for the prevention of accidents, comprises three miners, three timbermen, one electrician, one outside carpenter, one breakerman, two bratticemen, two inside company men, one machinist, the general outside foreman, the general inside foreman, assistant superintendent, superintendent, and a clerk; this group usually meets once a month to discuss unsafe conditions and practices in and about the mine. Members of this committee are chosen by the superintendent because of their interest in safety.

The Colonial Colliery is affiliated with the Holmes Safety Association and has one of the two chapters of that organization in the anthracite region. The meetings of the Holmes chapter are devoted entirely to the safety and welfare of the mining community and constitute a considerable part of the safety program at this mine. They are held each month in the community hall and are attended by the men, women, and children of the community. Outstanding leaders in safety and education work from time to time discuss subjects of local interest; moving pictures are shown; demonstrations of mine safety equipment are given; mine and community accidents are discussed; and entertainment of various kinds is furnished.

The company realizes the prime importance of safety education to accident prevention and has endeavored to have each employe accept personal responsibility for accident prevention rather than depend upon supervisors for his personal safety, thus establishing a spirit of self-reliance which, when of the right type, has incalculable value in the avoidance of accidents.

Every new employe and every man starting a new job is given instructions in the safe method of doing his work and the hazards connected therewith. In addition, two commercial bulletin services dealing with safety are used. On the surface, a large, illuminated bulletin board, which is passed by all employes, carries a new safety poster and a world news service three times a week, and outstanding safety posters from this board are then used on eight inside bulletin boards, four of which are enclosed in glass.

Although no definite standard of discipline has been established, the officials have found it necessary at times to penalize employes for violation of safety practices, rules, or orders; in extreme cases, such as direct and willful violations of the mining law, the offender has been discharged. Examples of recent cases are:

1. Penalized by lay-off and refusal of compensation in a case of smoking in a closed-light section of the mine which resulted in gas ignition and injury to the violator—one month lay-off.
2. Firing shot without giving warning of his intentions—two days lay-off.
3. Using fuse in violation of company rules—two men laid off for one week.
4. Smoking in closed-light section of mine—one week lay-off.
5. Walking up slope while cars were being hoisted—for first offense, laid off one week; for second offense, discharged.
6. Not planking manway—one week lay-off.

All accidents are reported on the standard insurance form issued by the Commonwealth of Pennsylvania, Department of Labor and Industry, Bureau of Workmen's Compensation.

In every case of injury the mine superintendent prepares a memorandum to the foreman in charge of the section calling his attention to the occurrence and requiring an explanation. Every serious or fatal accident and all unusual accidents are investigated by a committee comprising the foreman in charge of the section, the mine foreman, and the safety engineer; the report of this investigation is prepared by the safety engineer, who transmits it directly to the general manager. A separate investigation is made by the mine superintendent, who transmits his report to the general superintendent with a copy to the general manager.

In case of fatal or serious accidents, the mine safety committee makes a separate investigation and discusses its findings at the monthly safety meeting.

The company is self-insured, therefore has keen interest in accident prevention from the standpoint of immediate cost in compensation, medication, and hospitalization, which is sometimes overlooked by companies not self-insured.

First-aid training and equipment are maintained. Thirty-six active first-aid men are trained in the Bureau of Mines standard first-aid course and prepared to render assistance in case of injury; in addition, 36 previously trained men are capable of applying first-aid treatment.

First-aid stations or hospitals (10 underground and 2 on the surface) are maintained in each section of the mine at the mine foremen's offices.

The men at this mine who have been trained in first aid appear to be more careful, on the average, than those who have never been trained; it is reported that not one of the 72 trained in first aid has been injured since the first-aid training was completed. This confirms the experience of numerous companies in the mining and allied industries of the United States that a man who has been trained in first aid is less likely to be prone to accidents than a man who has never received such training.

The use of protective clothing, including goggles, shoes, and gloves, is advocated by the mine officials, while the use of protective hats is compulsory; this latter type of protection was introduced at the Colonial Colliery in 1929, when 43 protective hats were in use by the 986 underground employes. During that year underground workmen suffered 38 head injuries, entailing a cost of 286 days of lost time and medical and compensation cost to the company of $583.22. In 1930, 60 protective caps were in use and 37 head injuries sustained by underground employes, resulting in 716 days of lost time and medical and compensation cost of $3,631.70. In 1931, 970 protective caps were in use among the 979 underground employes; 11 head injuries resulted in 19 days of lost time and a cost of $33.89 in compensation and medication. During 1932 there were no head injuries, and to October 31, 1933, there were only two such injuries, a great reduction in head injuries, undoubtedly due in large part to the use of protective hats.

Table 4 shows the results of a concerted drive toward accident prevention from falls of roof which resulted in complete elimination of this type of accident in this large colliery for more than 23 months.

The last roof-fall accident occurred in this mine on November 28, 1931; and from that time to November 13, 1933, when a roof-fall accident ended the period, 1,186,817 tons of coal were mined by 2,648,540 man-hours of exposure without a single accident from this cause.

It will be observed from table 4 that the total medical and compensation cost for roof-fall accidents in 1931 was $9,370.88, with a production of 755,795 net tons of coal, a direct cost of 1.2 cents per ton for accidents of this type. It should be remembered that the direct cost does not begin to cover the entire cost of an accident; in fact, it is now thought that most companies can figure the actual cost at about 5 times the di-

TABLE 4.—ACCIDENT STATISTICS AT COLONIAL COLLIERY, 1931-33, INCLUSIVE

	1931	1932	1933 †
Number of lost-time accidents	147	104	129
Number of fatalities	3	1	1
* Days lost due to accidents (actual)	1,690	2,680	3,749
Roof-fall accidents	26	None	None
* Days lost from roof-fall accidents	685	None	None
Head injuries	11	None	2
Compensation cost, roof-fall accidents	$8,333.88	None	None
Medical cost, roof-fall accidents	$1,037.00	None	None
Production, net tons	755,797	580,543	513,514
Days worked by colliery	235	188	158
Man-hours worked underground	1,576,297	1,410,106	1,149,675
Employes underground	979	928	932

* Does not include standard loading for permanent disability or fatality.
† To October 31, 1933.

rect cost, which in this case would be 6 cents per ton in 1931 for roof-fall accidents alone.

A tabulation of the nationalities and ages of the employes of this mine reveals a general cross-section of the nationalities employed in anthracite mines; the ages range from 18 to 79 years.

By dividing the age group into four classes—18 to 30, 30 to 40, 40 to 50, and 50 to 80—it is noted that the ratio of accidents to the number employed decreases from 0.424 in the first class—18 to 30—to 0.122 in the 50- to 80-year class, indicating that the younger men are more liable to accidents than the older men; also it will be seen that those in the youngest group—18 to 20 years—comprising only 1 percent of the total number employed, were involved in more than 6 percent of the accidents, and that in 1932 there were approximately 2 accidents for each employe in this group.

TABLE 5.—NATIONALITY OF EMPLOYES AT COLONIAL COLLIERY IN 1932

National descent *	No.	Percent of total
Polish	211	18.8
Russian	183	16.3
Dutch	147	13.1
Italian	97	8.6
English	94	8.4
Slavic	94	8.4
German	71	6.3
Irish	68	6.0
Lithuanian	40	3.5
Welsh	40	3.5
Austrian	26	2.3
Hungarian	24	2.1
Tyrolean	8	.7
Ukrainian	5	.4
Scottish	4	.3
Belgian	3	.3
Spanish	3	.3
Negro	2	.2
French	2	.2
Norwegian	1	.1
Prussian	1	.1
Total	1,124	100

* 94.8 percent are American citizens and 81.3 percent are married.

TABLE 6.—AGE OF EMPLOYES AT COLONIAL COLLIERY IN 1932

Age	No. employed	Pct.	No. of injuries	Pct.
18-20	11	1	20	6.10
21-24	85	7.5	43	13.00
25-29	187	16.4	57	17.30
30-34	182	16.2	49	14.80
35-39	164	14.6	76	23.00
40-44	177	15.7	41	12.40
45-49	147	13.1	23	7.00
50-54	86	7.5	11	3.30
55-59	57	5.1	7	2.20
60-64	21	1.9	2	.60
65-69	5	.5	1	.30
70-74	1	.1	..	....
75-79	1	.1	..	....

An up-to-date record of all accidents, shown on a specially prepared chart, is furnished to the superintendent of each colliery operated by Madeira, Hill & Co., by the safety engineer. This chart (fig. 1) lists accidents according to causes and the seriousness of the injuries for each section in charge of a foreman. Figure 2, showing the number of roof-fall accidents, is kept in the colliery office, where it has aroused considerable interest among the mine officials. The heading on this chart emphasizes the drive being made to reduce the number of roof-fall accidents and indicates that it is being effective, not only at Colonial Colliery but at all collieries operated by Madeira, Hill & Co., where roof-fall accidents were reduced from 52 in 1931 to 3 in 1932.

That roof-fall accidents can be prevented and even eliminated for long periods has been clearly demonstrated at the Colonial Colliery, as well as at several other mines in the anthracite region, especially the St. Clair Coal Co. mine at St. Clair, Pa.; therefore, there is every reason to believe that with the proper safety organization and the concerted effort of all persons connected with the industry this major cause of accidents can be reduced materially or even eliminated in every mine, not only in this region but in all coal mines in the United States.

The Pennsylvania Department of Mines and B. I. Evans, state mine inspector, are to be especially commended for their accident-prevention efforts at Colonial Colliery, as well as at other mines in this region. The Pennsylvania Department of Mines should also be commended for the appropriate bulletins issued from month to month showing the accident standing of the various companies, as this type of competitive activity has a decidedly helpful effect in spurring the effort to avoid accidents.

Trends and Opportunities in Gold-Ore Treatment

(*Continued from page* 29)

trate, introduced in 1890, did not become a recognized trend in the Americas until application of flotation to a gold-ore pulp; although, being suitable for batch operation on a large or small scale, it has since been practiced extensively elsewhere, but rarely as a major phase of recovery operations. In all-slime cyaniding, and in the flotation of gold ores with cyaniding as a complementary process, apparatus and technique have reached a high standard of economy and efficiency, although some refractory ores still provide opportunity for special ingenuity and invention. The volatilization process has obvious merits, but research is apparently at a standstill, work to date indicating high extraction but low recovery.

Zinc-dust precipitation was introduced in 1894, but it found no extensive application until consumption of precipitant and cyanide was first reduced by systematic and deliberate deaeration of solution, in 1918, and recovery operations simplified. Precipitation by means of lump charcoal dates back to the early days of the cyanide process, but the precipitant was not used in efficient form until 1917, following research that established the reaction primarily as a physical one. Investigations in activating the char were thereby stimulated, with excellent initial results; but the work lacked commercial incentive and was abandoned. Recognition of the advantages of a precipitant that introduces no fouling element into the solution is easily and cheaply smelted to produce high-grade bullion, may again suggest revival of interest and resumption of research activity. Whether or not char will eventually find application as a cheap and efficient "precipitant" for gold in cyanide solutions remains to be determined by impartial research. Pessimistic prediction is not justified. It calls to mind the advice of a distinguished American mining engineer in 1890, who dismissed the potentialities of a process that subsequently doubled the world's output of gold in a decade by stating that "as a means of extracting gold I can more conscientiously recommend aqua regia than potassium cyanide."

The future of the metallurgy of gold depends on the extent to which research is undertaken on individual ores by those with practical experience. A verbal economist suggests that research is search. Why not use the shorter word, he urges. But he forgets the significance of the prefix, which the dictionary defines as "Back, as 'back to an original . . .'" Research, therefore, involves prior cultivation of an open and unbiased mind, followed by intelligent construction, not merely acquisition and imposition. It means the design of a new building from the foundation, not the construction of a penthouse on the roof of one already in service. And when the metallurgist who is not influenced by popular trends studies the foundations of the art he will find much opportunity for initiative and invention, engendering a respect for simplicity and economy as desirable elements in the development of a new technique.

The Wheels Of Government

WITH the President and his aides back from the hinterlands, where they have crossed and recrossed the country in a selling campaign for the "New Deal," Washington is showing an even more hectic atmosphere. To the casual observer, the absence of these chieftains did not materially lessen the whirling of the "wheels of government." As a matter of fact there are so many wheels—so many wheels within wheels—that unless one is acclimated the bewilderment is acute, and Washington becomes not Washington, but a gigantic House of Magic, with all sorts of rabbits and paraphernalia of various kinds bobbing up in unexpected places.

The trained Washington observer, treading his way among the devious paths, sticks close to the subject matter of special interest to his constituents. In that way—and only in that way—does he escape madness. This labyrinth and multiplicity of fact, fancy, fiction and feud that go to make up our present day Seat-of-Government, has not been lulled into inactivity by the humid August weather; nor by the absence of Congress; nor by the absence of President Roosevelt and the so-called "brain-trusters". The wheels have been moving fast, and furious activity has marked the trying August days.

The mining industry has been knee deep in the welter with the nationalization of silver; the new director of the Bureau of Mines; efforts to secure codes for iron and zinc; regulations for copper; change and confusion in bituminous codes and budgets; labor troubles, starting and ending, in the newly created National Labor Board; loans to mining enterprises under the recent legislation; bargaining tariffs; and the drafting of new regulations for the administration of the revenue law of 1934.

Washington has been rife with conjectures concerning the future of the NRA. The President dispelled some of the guessing by the announcement that General Hugh S. Johnson was here to stay and that he would continue to head the recovery program. Much interest also attaches to the President's announcement that he will again confer with industrial leaders as to the future of the recovery program. Much is anticipated from the conference, although through the various polls conducted by a number of agencies, it seems apparent that the New Deal is still on steady ground as far as the voting populace is concerned. Along this line it is interesting to observe the statement by *Fortune*, a national magazine reaching the high stratum of American life, that 70 percent of the industrial leaders in this country are in favor of the NRA, and do not wish it discontinued.

Perhaps the most startling and far reaching activity during the month was the proclamation for the nationalization of silver. The President issued the proclamation under the authority vested in him by the Silver Purchase Act of 1934. Under the terms of the proclamation, holders of silver are required to turn in their stocks at the mints within 90 days. Silver coins and industrial silver are excepted. This is in line with the policy when gold was "nationalized," except with gold, coins were also demanded. Speculation is rife as to what steps will next be taken. Experts believe that definite inflation will follow before many months, in which case it is quite likely that the administration will raise the price of newly mined silver considerbaly. One authority says, "It appears eminently logical that if the eventual step is the printing of silver-backed currency against the full bullion reserve, it will be purchased at the 50.01 figure, due to nationalization (netting the Federal treasury an immense profit which will be important in the budget balancing) the price of the newly mined domestic metal will gradually be increased." A. G. Mackenzie, secretary of the Utah Chapter, The American Mining Congress, in commenting upon the President's action, said:

"The action by the President is in accordance with the provisions of the Silver Purchase Act approved June 19 and is designed to remove from private ownership and place in the U. S. Treasury all domestic silver bullion, with certain exceptions. The exceptions include silver in process of production and refinement, silver for industrial use and silver necessary to complete contracts. The order does not affect silver coins or articles of ornament or use already manufactured.

"The purpose of the action is unquestionably to increase the world price of silver, and thereby to improve world commodity prices. As far as the domestic silver producer is concerned, the order will have no effect immediately, at least, as newly mined silver of domestic origin has been delivered to the Government at a price of 64½ cents since December 21, 1933, and this procedure is not affected by the new order. If, as a result of Thursday's action or other causes, the world price should rise to 64½ cents or higher, it is expected that the Government will increase its price for silver of domestic origin accordingly. This is the view of public men who have been closely associated with the development of the administration's silver program.

"With the Government taking the current domestic mine production of silver and all the bullion in private hands except bullion designed for immediate domestic consumption in the arts and industries, the United States is out of the silver export market. This country has produced more than one-fourth of the world's silver in the last 20 years, and its production and private stocks are now definitely removed from the world's market, at least until the world price of silver reaches $1.29 an ounce.

"The position of this country thus narrows the world current silver supply by one-fourth. The world supply is further restricted by the operation of the London agreement of 1933, by the terms of which the participating countries agree to restrict government sales of silver and to acquire for government account an amount of silver equivalent to their sales. This agreement includes the principal silver-producing and silver-owning countries, the United States, Mexico, Canada, Australia, Peru, China, India and Spain. Sales by the Indian government are restricted to 35,000,000

ounces annually, by Spain to 5,000,000 ounces annually and China agrees not to offer for sale any silver realized through debasement of Chinese coinage.

"It is, therefore, a fair assumption that the effect of these various acts by these various governments will be to accomplish a substantial increase in the world silver price, especially if the United States should extend its silver purchasing activities to other countries, as well as our own."

Nellie Taylor Ross, Director of the Mint, issued the following instructions for delivering silver to the assay office in New York City under the "nationalization" order:

"1. If the silver is in your possession, send it to the New York Assay Office at old Slip and South Street, which is near the foot of Wall Street on the East River.

"2. If the silver is in a bank or an approved warehouse and you have the warehouse receipt, endorse the receipt to 'Superintendent, U. S. Assay Office;' have this endorsement guaranteed by your bank or a Commodity Exchange Clearing broker, and deliver or send the warehouse receipt to the Assay Office.

"3. If the warehouse receipt is in the hands of your broker or bank, arrange for the broker or bank to deliver the receipt to the Assay Office endorsed as above.

"4. If you deliver the silver itself, an advance payment up to 95 percent will ordinarily be made at once, and the balance will be paid after the exact value has been determined. If the warehouse receipt is turned over to the Assay Office, the advance payment up to 95 percent will ordinarily be made within 24 hours.

"5. The Government will pay all proper delivery charges, and will pay storage from the time the Assay Office accepts delivery of warehouse receipts."

In an official release, the President, on August 16, announced the appointment of John Wellington Finch as Director of the United States Bureau of Mines. Mr. Finch replaces Mr. Scott Turner, a Hoover appointee, who returns to private practice. Mr. Finch has long been identified with the mining industry, first as a Coloradian, associated with the late D. W. Brunton, world-famous engineer and mining man, and more recently as an Idahoan, serving as dean of the School of Mines at Moscow, Idaho. In his announcement of the appointment, the President said:

"Mr. Finch was born in Lebanon, N. Y., in 1873. He received his A.B. degree from Colgate University in 1897, his A.M. degree the following year, and the degree of Sc.D. in 1913. He is a Fellow of the University of Chicago. His technical experience includes that of geologist for the Rock Island Railroad in Texas and Oklahoma. He was state geologist for Colorado from 1901 to 1906, and was consulting geologist and engineer for several mining companies, his experience covering eastern and western states, Canada, Mexico, South Africa, China, Siberia, Siam, Burma, and other Asiatic countries. He was industrial adviser to the government of the Yunnan Province, China, from 1920 to 1924. For 20 years, at various times, he was an expert for the United States Department of Justice, investigating frauds in mining stock sales. His experience includes management of mining undertakings in this country, Asia and Africa.

Harris & Ewing

Dr. John Wellington Finch Being Sworn In As the New Director of the United States Bureau of Mines

"He was an instructor at Colgate University in 1898 and at the University of Chicago the following year, and a lecturer on mining at the latter university in 1912. He was Professor of Mining Geology at the Colorado School of Mines from 1925 to 1929 and Dean of the School of Mines of the University of Idaho from 1930 to 1934. At the same time he was Director of the Idaho State Bureau of Mines and Geology.

"He is a member of a number of geological and engineering societies and is the author of articles on mining, geology and the petroleum industry. He was editor-in-chief of *Ore Deposits of the Western States*, issued this year."

It is to be hoped that the Bureau will now receive the consideration and treatment to which it is entitled. It has been little short of an insult to the great mining industries of this country that their only servant in the Federal Government has been treated as an orphan, shunted, willy-nilly, from one department to another, having its appropriations curtailed and restricted. The mining industry is one of the most, if not the foremost, national tax payer. Interesting available figures indicate such startling facts as that in the year of normal prosperity, the mining industry paid in Federal taxes better than $16,000,000, and received in direct technical aid from the Government slightly more than $3,000,000 for its Bureau of Mines. That same year, Agriculture paid a tax of approximately $28,000,000, and received in direct Federal aid more than $136,000,000. The mining industry has been modest, indeed, when we consider that service to it has been curtailed to a little more than a million dollars, while taxes have not decreased in anything like such proportion. Mining men have demonstrated how fair, reasonable and unselfish they are.

The American Mining Congress, through its National Committee for the Rehabilitation of the Bureau of Mines, of which Mr. Eugene McAuliffe, President, Union Pacific Coal Company, is National Chairman, inaugurated in August the beginning of its fall campaign. The committee, in cooperation with all branches of mining, will compile, publish and distribute a special pamphlet which will have for its major purpose a better understanding of the needs of mining. The pamphlet will present three phases: (1) The economic importance of the mining industry in our industrial life, presenting information upon the number of mines, number of workers, annual payroll, annual state and Federal taxes paid, communities dependent in whole or in part upon mining enterprises, industries dependent in whole or in part upon the products of mines; (2) the functions and services of the Bureau of Mines, how it is now organized, and what it is doing to assist mining; and (3) comparative data in relation to Government aid to other industries and mining. The pamphlet will also present a foreword summarizing the purposes of the committee, and a conclusion presenting the recommendations of the committee for restoring the Bureau to its normal efficiency.

The Securities and Exchange Commission has issued rules and regulations for the registration of both securities and exchanges.

Stock exchanges throughout the country must, before September 15, file application for registration or exemption under the new Act and, by October 1, be properly registered or exempted, or else go out of business. This order was promulgated at the Commission at the same time the rules and regulations were made public.

The regulations issued contain only two specific requirements of exchanges: (1) To agree to expel members for violation of rules, and (2) to enforce the Securities Exchange Act.

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MINING EVENTS

Gold and Silver

THE MOST IMPORTANT monetary step since the devaluation of the gold dollar took place recently when silver was nationalized.

In a formal proclamation and Executive order, countersigned by Secretary of State Cordell Hull, the Federal Government officially takes possession of all silver stocks in the nation. The proclamation and Executive Order calls for the delivery of all silver within 90 days and fixes a price of 50.01 cents a fine troy ounce.

Newly mined domestic silver is not affected as to price by the nationalization order, the price remaining at the 64½ cents figure originally fixed. Certain classes of silver are exempted from the delivery requirement. Ample provision is made for licenses to cover silver needed for industrial uses and to fulfill outstanding obligations to deliver silver.

The proclamation authorizes the mints to receive any and all silver situated in the United States on August 9. The mints are directed to deduct as seigniorage, etc., 61 8/25 percent of the silver so received and to return to the depositor in standard silver dollars, silver certificates, or other coin or currency of the United States, an amount equal to the monetary value of the balance; i. e., 50.01 cents an ounce.

Treasury Secretary Morgenthau, answering queries on the nationalization step, said there seems to be available for all legitimate professional and artistic uses ample supplies of silver and not falling within the class of silver which must be turned into the Government. He added, however, that should there be any shortage for these uses or if it should not be available at reasonable prices, the Government would immediately see that there were made available ample supplies of silver at current prices.

Quoting from the Gold Reserve Act and the Silver Purchase Act, under the authority of which the nationalization order was issued, the President's proclamation declares that to "assist in increasing and stabilizing domestic prices, to protect our foreign commerce against the adverse effect of depreciated foreign currencies," the mints shall receive for coinage or for addition to the monetary stocks of the United States, any silver which such mint, subject to regulations prescribed by the Secretary of the Treasury, is satisfied was situated on August 9 in the continental United States, including Alaska.

The Executive order is fully as drastic as that on the gold and requires the delivery of silver stocks, with certain limited exceptions. Exemptions noted, so long as they continue to fall within those categories, include foreign or domestic silver coins, silver of a fineness of .8 or less which has not entered into industrial or other uses, silver mined after December 21, 1933, from natural deposits in the United States (provided that before the effective date of the order if not deposited with a mint and if processed to a .8 fineness *within* 75 days from the effective date it must be delivered within 90 days from date of order, and if processed to a fineness of more than .8 *after* 75 days from the date of the order, it must be delivered wtihin 15 days thereafter), silver held for industrial, professional, or artistic use and unmelted scrap silver in an amount not exceeding 500 troy ounces belonging to one person, silver held under a license issued in accordance with Sec. 6 (for industrial use, re-export, to fill an obligation to deliver silver to a third person and incurred before the effective date), silver contained in fabricated articles and held in good faith for a specific and customary use and not for their value as silver bullion, and silver owned on the effective date by a recognized foreign government, foreign central bank, or the Bank for International Settlements.

BUT, HERBERT, WE'VE GOTTA BOOK

—Washington Daily News

Rules and regulations prescribed by the Treasury under the Executive Order and proclamation are too lengthy to include in the Bulletin. Those interested will be furnished copies by the American Mining Congress.

THE TREASURY published detailed instructions to holders of silver as to methods of delivering their metal under the new nationalization order to the New York City Assay Office. Instructions follow:

"If the silver is in your possession, send it to the New York Assay Office, at Old Slip and South Streets. If the silver is in a bank or an approved warehouse and you have the warehouse receipt, endorse the receipt to the superintendent of the United States Assay Office. Have this endorsement guaranteed by your bank or a Commodity Exchange clearing broker and deliver or send the warehouse receipt to the Assay Office.

"If the warehouse receipt is in the hands of your broker or bank, arrange for the broker or bank to deliver the receipt to the Assay Office endorsed as above.

"If you deliver the silver itself an advance payment up to 95 percent will ordinarily be made at once and the balance will be paid after the exact value has been determined. If the warehouse receipt is turned over to the Assay Office the advance payment up to 95 percent will ordinarily be made within 24 hours.

"The Government will pay all proper delivery charges and will pay storage from the time the Assay Office accepts delivery of warehouse receipts."

The instructions for silver delivery were signed by Nellie Taylor Ross, Director of the Mint.

On Monday the Treasury took over the first silver under the President's "nationalization" Executive Order.

Correspondence between President Roosevelt and Secretary Morgenthau relating to the silver program was made public at the Treasury Department.

The President's first letter, dated June 14, sent to Mr. Morgenthau, authorized the issuance of silver certificates in denominations of $1, $5, $10, $20 and $100 "against any and all silver bullion or standard silver dollars now in the Treasury not held for redemption of any outstanding silver certificates." This silver totaled about 62,000,000 ounces, including that acquired from foreign governments on war debts under the Thomas amendment, from the newly mined product and from other silver that had accumulated in the Treasury from time to time, which had not been used as the basis for silver certificates.

President Roosevelt then on August 13 sent a letter to Secretary Morgenthau authorizing the issuance of silver certificates against silver in the Treasury "not then held for redemption of any outstanding silver certificates, and in a face amount equal to the amount returned for silver received at the United States mints and assay offices on and after June 15, 1934, whether under the proclamation of December 21, 1933, or under the proclamation of August 9, 1934."

The President added:

"Pursuant to the authority vested in me by Section 7 of the Silver Purchase Act of 1934, I hereby direct that such portion of the foregoing silver as is not held for the redemption of silver certifi-

cates shall be added to the monetary stocks of the United States and held as bullion in the general fund of the Treasury, but shall be carried on the books of the Treasury at cost."

The Secretary disclosed that under the Executive Order of December 21, 1933, the Treasury so far has acquired 10,671,000 fine ounces of silver. For the week ended August 10, 254,457 ounces were received, including 3,252 ounces at the Denver Mint and 251,205 ounces at the San Francisco Mint.

The foreign market continued firm, Shanghai cables reported speculators uncertain over the outlook, both buying and selling, with a price range of 35 5/16 cents to 35 7/16 cents. The close was 35⅜ cents. The London rate was advanced 1/16d. to 21⅝d.

Handy & Harman's quotations continued unchanged, 49¾ cents for foreign and 64⅛ cents for domestic.

Lead and Zinc

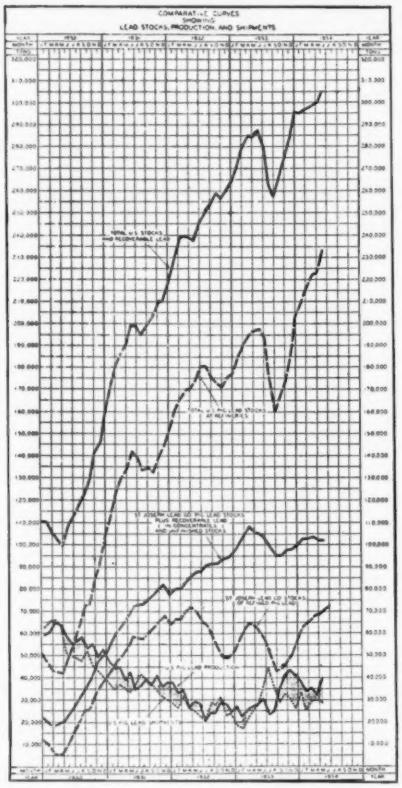
IN THE SEMI-ANNUAL report to the stockholders of the St. Joseph Lead Company, Chairman C. H. Crane, again presented a chart of comparative curves, showing lead stocks, production and shipments. His explanatory statement accompanying the chart follows:

Due to the interest that has been shown in the chart illustrating the conditions that have prevailed in the United States lead mining industry, it has been brought up to date and is again submitted.

The lined areas between the two curves at the bottom of the chart show the excess of pig lead production over the shipments. Although the production was curtailed, it is noted that the demand fell even more rapidly. These curves correctly represent the picture of the industry as a whole, but the basic figures are somewhat low, as the output and sales of the secondary lead smelters are not included due to the lack of exact figures.

The two upper curves are based on the monthly reports of the American Bureau of Metal Statistics and cover the operation of all primary United States lead smelters. The area between the curves reflects the recoverable lead in the stored concentrates and material in process at the smelters.

The lower comparative curves show the lead inventory of the St. Joseph Lead Company. The drop in the pig lead stocks between May and November, 1932 and 1933, is due to closing down of the Herculaneum Smelter. The increase in the company's lead inventory would have been even greater if the mine production had not been reduced from the 100 percent time basis to 75 percent on November 1, 1930, to 60 percent on October 1, 1931, to 50 percent on April 1, 1932, and finally to 25 percent on April 1, 1933. Due to the increase in the cost of living, it was necessary to increase the working basis to 33 1/3 percent on May 27, to 37½ percent on August 28, and back to 50 percent on October 1, 1933. This rate was continued until March 1, 1934, when it was again necessary to curtail the production, and employment was reduced from a six to a five-day week. All hourly men are at present working 10 days per month. As the stockholders have previously been advised, the large lead inventory has been accumulated due to the company's policy of maintaining employment at the highest possible level.



When it is realized that the smallest total inventory of lead stocks approximated 100,000 tons for the United States and 12,000 for the St. Joseph Lead Company and its subsidiaries, the present stocks are not excessive if normal business conditions are again experienced, as the normal primary lead consumption for the United States is about 60,000 tons per month. (As reported by *American Metal Market.*)

FORTY-FIVE of the 60 major mines and mills of the tri-state district were operating the past week, compared to six the preceding week. Production of zinc concentrates jumped to 5,900 tons, as compared to 740 tons the previous week. Shipments Saturday amounted to 5,904 tons, while a week earlier the shipments were 3,830 tons. Shipments of zinc concentrates from tri-state district have been increasing gradually for the last four weeks, or since the shut-down agreement. Purchases were given Saturday at 5,730 tons as compared to 4,780 the previous week. Price remained at $28 a ton.

Stocks of zinc concentrates owned by mine operators and in bins in the tri-state field, now stand at about 13,000 tons, or 1,000 more than on January 1, 1934. There has been a reduction of about 10,000 tons in recent weeks during the mine shut-down.

Production of zinc concentrates for the year, to August 1, stands at 168,000 tons, with purchases and shipments about the same amount.

Water for mining operations is low and some major mines are not able to operate.—Special to the *Wall Street Journal.*

C. S. TRENCH & COMPANY, INC., say as follows:

"Zinc is an item which would seem to be worthy of consideration just now. Consumption is undoubtedly at low

TRI-STATE ZINC AND LEAD ORE PRODUCERS ASSOCIATION

Bulletin for Week Ending August 11, 1934

(Dry tons of 2,000 lbs.)

	Zinc Concentrates			Lead Concentrates		
	This week	Last week	Year ago	This week	Last week	Year ago
Total stocks (sold and unsold)	15,744	15,504	8,961	13,399	13,173	12,841
Net reserve stock	13,771	14,139	4,775	13,250	12,873	12,188
Production *	6,802	5,053	4,892	782	717	573
Shipments	6,562	6,055	5,546	556	575	921
Sales reported	7,170	6,860	6,165	405	875	1,247
* Included Tailing Mill Production	1,306	936	830			
Base price—Joplin	$28.00	$28.00	$35.00	$37.50	$37.50	$52.50
Metal price—Average for week—Zinc, E. St. L.—Lead, St. L.	4.300c	4.300c	5.000c	3.600c	3.625c	4.350c

Mill Statistics

	This week	Last week
Mine mills operated 32 hours or more	28	23
Mine mills operated less than 32 hours	0	3
Tailing mills operated 96 hours or more	14	12
Tailing mills operated less than 96 hours	2	5
Total mills which produced more than 25 tons during week	44	43
Mills which produced less than 25 tons during week	6	5
Total number of mills operated during week	50	48

Mine Mills Operated This Week: Adm. No. 2, Amer. Diamond, Beck No. 3, Black Eagle, Mary Jane, Canadian, C. M. & R. See Sah & Wilbur, VH Barr, Century Goodeagle, Dines Wilson, EP Central, John L, EW No. 4, Federal Jarrett, K. & O. Discard, Lawyers, Lucky OK, Locklyn, Mary M. Beck, Mid-Continent, Mission, Prairie Chicken, Ramage, Redskin, Rialto, Skelton, St. Louis No. 4 and No. 8, Sixty-six, UZ, Royal, Velie Lion, Zig Zag, Diamond Joe.

Tailing Mills Operated This Week: Baxter Chat, Cardin, C. M. & R. Chubb, King Brand, EW No. 7, F. & B. Bluebird, Hutts, Interstate Woodchuck, Myers No. 2, Mineral Recoveries, Pioneer, Semple Rightley, Mo. Chitwood, Tri-State Ottawa, Youngman.

ebb—certainly that is true of market demand. But, against this, it is worth noting that production is also at a low point and that statistically the position of zinc is excellent.

"Production of slab zinc during the first six months of 1934 averaged about 31,200 tons per month or slightly over 1,000 tons per day. During this period Joplin ore production reached a peak of 8,000 tons per week and ore stocks about 22,000 tons. For the past month this ore production has averaged under 800 tons per week—equal to around 400 tons of metal—while ore stocks are down to 13,000 tons.

"Shipments for the same period averaged a little over 33,100 tons per month against an average 'unfilled order' tonnage of 24,220 tons for the period. The 'unfilled order' tonnage has now dropped to 16,900 tons—of which Prime Western is 15,500 tons.

"It is hard to escape the conclusion that even though consuming operations are running light and though this may continue for another 30 days, consumers are under-bought and, upon only a moderate improvement in business, will have to come into the market. While stocks are sufficient for approximately three months' shipments, at the first six months average rate, it must be remembered that a considerable amount of this stock is strongly held for higher prices.

"There is little probability of any material weakening in prices under these conditions. On the contrary, the stage appears to be set for higher prices as demand reappears, either because of actual business or fear of inflationary measures. In this connection it may be noted that the average price for 1926 was 7.37 cents. To reach this price would mean an advance of 71.4 percent from the present price of 4.30 cents but strange things do happen nowadays."

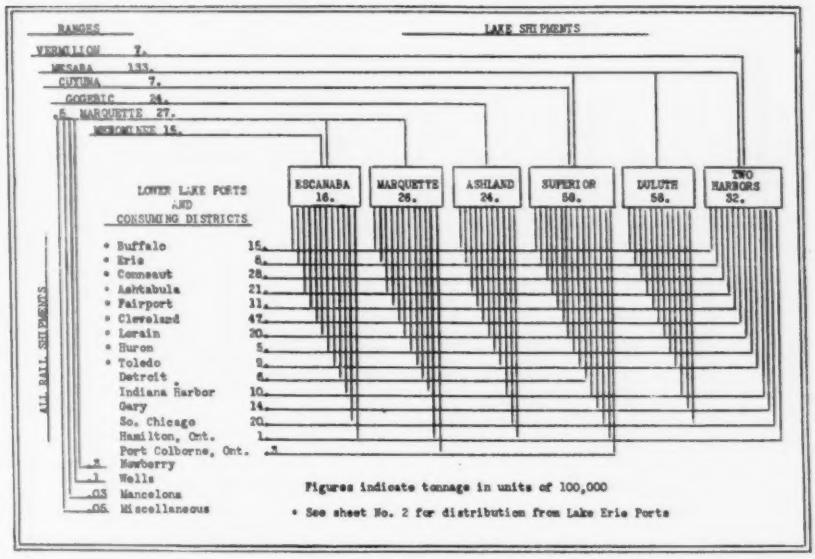
Iron

PUBLIC HEARING on a proposed code of fair competition for the iron ore mining industry will be conducted by Deputy Administrator Walter A. Janssen on Monday, August 6, at the Willard Hotel, Washington, D. C.

Sponsored by a committee from the industry, the proposed code provides for an average 40-hour week in each 4 or 5-week period, no one week to be longer than 48 hours, "so long as employes qualified for the work required shall be available in the respective localities where such work shall be required."

For purposes of administering the code, the country is divided into two regions: Region No. 1, consisting of the states of Minnesota, Michigan and Wisconsin; and Region No. 2, comprising the remainder of the country and being itself subdivided into Eastern, Western and Southern districts.

Minimum hourly rates of pay are proposed as follows: 40 cents in Region No. 1 and in the Western district of Region No. 2; 35 cents in the Eastern district of Region No. 2; 27 cents in Jefferson County, Ala., and 25 cents in the remainder of the Southern district of Region No. 2.



Distribution of Lake Superior Iron Ores from Ranges Through Upper Lake Ports to Lower Lake Ports and Direct All-Rail to Consuming Districts Season 1933

Code Authorities of five persons each would be provided for each of the two regions, to be elected by the members of the industry in each region—on the basis of a weighted vote. In the case of Region No. 2, the proposed code provides that each of the three districts shall have at least one representative on the Code Authority.

Trade practice rules are to be drawn up and presented to the Administrator for his approval at a later date.

THE SCRAP METAL FIELD, particularly iron and steel, is booming, Commerce Department reports show. Exports of iron and steel scrap increased 108 percent for the first six months of 1934 over the same period in 1933. The last six-month total of 738,848 tons shipped was the highest ever recorded in any six months period in history, the Commerce Department said.

Japan received the bulk of the shipments: 407,592 tons, or 55 percent of the total.

JUNE IMPORTS of iron and steel products into the United States dropped to a new low, being 4,600 tons under the total of the preceding month and 9,510 tons less than the June, 1933 total, the Commerce Department Iron & Steel Division reports. Total June imports were 24,858 tons.

Increases were, however, recorded in 19 classifications and decreased in 13. Decreases were more pronounced and included scrap and pig iron, barbed wire. Increases were noted in rails and rail fastenings, hoops and bands, ingots, welded pipe, wire rods.

The principal import was, of course, pig iron, amounting to 5,168 tons, and coming from British India, Netherlands, Canada, Kwantung, Norway, Sweden. Next in importance was ferromanganese and spiegeleisen, 3,761 tons of which came from United Kingdom, Norway and Canada.

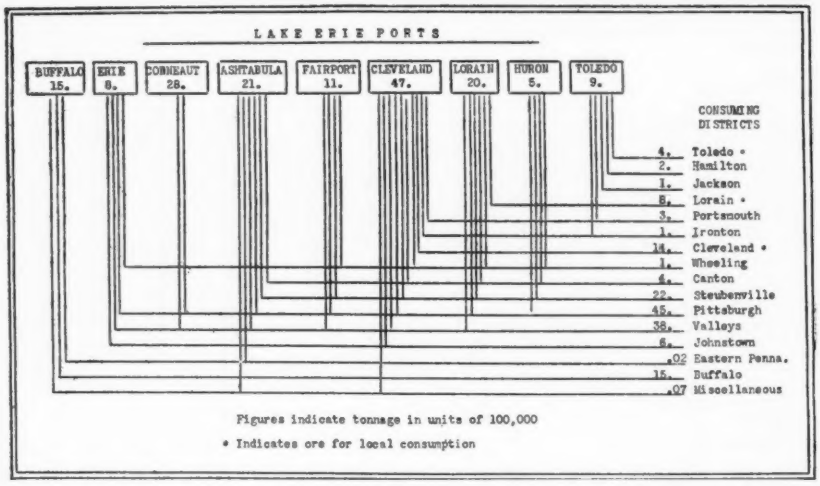
The total imports for the first half of 1934 totaled 167,638 tons as compared with 152,600 tons for the same period a year ago.

A NOTABLE INCREASE in the number of men employed at iron ore and other metal mines in Minnesota during the calendar year 1933 when compared with 1932, was shown by reports from mining companies to the United States Bureau of Mines. The increase was accompanied, however, by a slight increase in the number of accidents to the men employed at the mines, says *Skillings Review.*

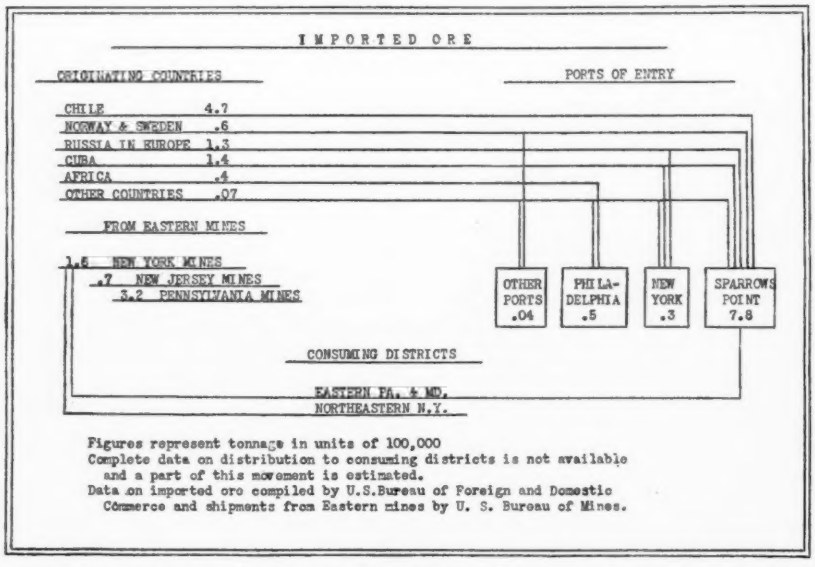
Reports showed that 71 mines were in operation in Minnesota during the year and that 5,854 men were employed. These figures represented an improvement over those for 1932 which showed 60 active mines at which 3,511 men were employed. Accidents during 1933 caused 3 fatalities and 101 nonfatal injuries and resulted in a fatality rate of 0.45 and an injury rate of 14.98 per million man-hours of exposure to risk. Rates for the preceding year were 0.32 and 14.06. The total period of exposure of all employes during 1933 was 6,740,849 man-hours, an increase of 8 percent over 1932.

The combined accident rate for fatalities and injuries for mines in St. Louis County, the principal mining county in Minnesota, was 13.91 per million man-hours of exposure, slightly more favorable than the average rate for the state as a whole.

The mining industry in Minnesota has for a number of years conducted its operations with a particularly small number of accidents as compared with many other states. In 1932, the latest year for which the United States Bureau of Mines has complete figures for all



Distribution of Iron Ore from Lake Erie Ports to Consuming Districts Season 1933


IMPORTED ORE
ORIGINATING COUNTRIES
PORTS OF ENTRY
CHILE 4.7
NORWAY & SWEDEN .6
RUSSIA IN EUROPE 1.3
CUBA 1.4
AFRICA .4
OTHER COUNTRIES .07
FROM EASTERN MINES
1.6 NEW YORK MINES
.7 NEW JERSEY MINES
3.2 PENNSYLVANIA MINES
OTHER PORTS .04
PHILADELPHIA .5
NEW YORK .3
SPARROWS POINT 7.8
CONSUMING DISTRICTS
EASTERN PA. & MD.
NORTHEASTERN N.Y.
Figures represent tonnage in units of 100,000
Complete data on distribution to consuming districts is not available and a part of this movement is estimated.
Data on imported ore compiled by U.S.Bureau of Foreign and Domestic Commerce and shipments from Eastern mines by U. S. Bureau of Mines.

Distribution of Imported Iron Ore Through Ports of Entry and of Ore from Eastern Mines to Consuming Districts Year 1933

states, the accident rate for Minnesota was the lowest, and therefore the most favorable, among all important metal-mining states.

Accidents at iron ore mines, and at other metal and nonmetal mines (except coal) in Michigan during the calendar year 1933, resulted in 9 fatalities and 262 nonfatal lost-time injuries. The reports covered 63 mines at which 6,282 men were employed during the year, and at which a total of 7,920,927 man-hours were worked. The fatality rate per million man-hours of exposure to risk was 1.14 as compared with 0.43 for the previous year when five men lost their lives by accidents at the mines. The accident-frequency rate for nonfatal injuries of one or more days of disability to the injured employes was 33.08 as compared with 27.93 for the year before.

Gogebic County, where the largest number of men were employed, had an accident rate of only 18.87 for fatal and nonfatal injuries, a much more favorable rate than that of 34.22 for the state as a whole.

Mines in the upper peninsula of Michigan reported a fatality-plus-injury rate of 33.11; those in the lower peninsula reported a rate of 64.53 per million man-hours of exposure.

REPORTS by 13 of the leading steel companies for the quarter ended June 30, last, showed net profits after all deductions, including interest, depreciation, Federal taxes, etc., of $20,148,226, according to a compilation by Dow-Jones. All of the companies were in the black during the period, when operations were at an average of 53.9 percent of ingot capacity.

The second quarter showing was in sharp contrast with the first three months of the year, when eight of the companies reported net losses and five had net profits, the results being a net loss after all deductions of $7,293,379. Ingot production in that period was at 40.3 percent. For the June quarter of 1933, with ingot output at 34.8 percent of capacity, seven companies had losses and six reported a profit.

For the first half of this year reports are available from 16 companies showing net profits of $14,746,958. Operations in that period were at an average of 47.11 percent of capacity. Thirteen of the companies had profits, and three—United States Steel, Jones & Laughlin and Youngstown Sheet & Tube—reported net losses after all deductions but before preferred dividends.

In the six months ended June 30, 1933, when operations were at 26.34 percent of ingot capacity, 13 of these companies had losses and only 3 showed a profit, the result being an aggregate net loss of $48,637,533. For the first half of 1932 there were 14 companies with losses and 2 with profits, and the net loss amounted to $64,669,061. Operations then were 22.82 percent of capacity.

Copper

STOCKS OF REFINED copper in the United States declined about 32,000,000 pounds in July, but foreign stocks of refined copper increased about 21,000,000 pounds, to leave a net reduction for the month in the world of 11,000,000 pounds. In June world stocks of refined copper declined about 72,000,000 pounds, the largest reduction in any month since July, 1933, when the reduction was 76,000,000 pounds, says the *Wall Street Journal.*

Apparent domestic consumption of copper in July was about 60,000,000 pounds against consumption of over 92,000,000 pounds in June. The apparent foreign consumption of copper in July was 154,000,000 pounds against consumption of 166,000,000 pounds in June, indicating that the German situation did not affect foreign consumption as much as had been expected. The apparent world consumption during July was about 214,000,000 pounds compared with 259,000,000 pounds in June.

United States mine production of copper in July was 37,000,000 pounds compared with 31,000,000 pounds in June. Foreign mine production was just under 145,000,000 pounds against 142,000,000 pounds last month.

Scrap production for the United States in July was about 23,700,000 pounds against 34,000,000 pounds in June. Foreign scrap production in July was about 8,000,000 pounds compared with 8,800,000 pounds in June.

Stocks of refined copper in America at the end of July were 497,000,000 pounds, a reduction of 69,000,000 pounds during the month and stocks at refineries outside of America were 54,000,000 pounds compared with 53,000,000 pounds at the end of June.

Domestic stocks on consignment were over 63,000,000 pounds at the end of the month against 61,000,000 pounds at

the end of June. Foreign stocks on consignment were 137,000,000 pounds against 124,000,000 pounds at the end of June.

Copper paid for by consumers but not shipped at the end of July totaled 232,000,000 pounds against 198,000,000 pounds at the end of June. Foreign copper, paid for but unshipped, was over 7,000,000 pounds at the end of July against 6,000,000 pounds at the end of June.

THE NATIONAL Recovery Administration announced its recognition of Code Authority members and their alternates for the copper industry. Members were selected by primary producers, custom smelters and refiners, the wire and cable subdivision, and the electrical manufacturing industry and the Code Authority of the copper and brass mill products industry.

Members of the Copper Code Authority and their alternates are as follows:

E. T. Stannard, Kennecott Copper Corporation, 120 Broadway, New York City. Alternates, C. T. Ulrich, R. C. Klugescheid.

C. F. Kelley, Anaconda Copper Mining Company, 25 Broadway, New York City. Alternates, James R. Hobbins, Robert E. Dwyer, Edward Mosehauer, E. O. Sowerwino.

L. S. Cates, Phelps-Dodge Corporation, 40 Wall Street, New York City. Alternates, J. F. McClelland, C. E. Dodge.

A. E. Petermann, Calumet & Hecla Consolidated Copper Company, 25 Broadway, New York City. Alternate, Philip F. Blandin.

George A. Ellis, United Verde Copper Company, 120 Broadway, New York City. Alternates, E. H. Westlake, Thos. Bordon.

F. H. Brownell, American Smelting & Refining Company, 120 Broadway, New York City. Alternates, Hamilton M. Brush, John C. Emison, K. C. Brownell, Roger W. Straus, Charles Earl.

B. N. Zimmer, American Metal Company, 61 Broadway, New York City. Alternates: Ludwig Vogelstein; Otto Sussman, Harold Hochschild, Heath Steele.

Pope Yeatman, Yeatman & Barry, 165 Broadway, New York City.

Clinton H. Crane, St. Joseph Lead Company, 250 Park Avenue, New York City.

William H. Anderson, John A. Roebling's Sons Company, 6 Church Street, New York City. Alternate, E. N. Hammond.

W. M. Goss, Scovill Manufacturing Company, 280 Broadway, New York City. Alternate, Ralph E. Day.

Coal

THE BRIGHTEST NEWS the coal industry has received in many months is carried in the latest export and import figures compiled by the Department of Commerce.

Coal exports for the first six months of 1934 are up 37 percent over the same period in 1933, the figures show. Interesting in this connection is a six-page summary of the international coal trade, comprising the July bulletin of the Mineral Division of the Bureau of Domestic and Foreign Commerce. This publication, No. 4826, may be obtained through the American Mining Congress.

Domestic bituminous coal production dropped slightly for the week ended July 21, although anthracite production jumped some 30,000 tons.

JUNE EXPORTS of American coal reached the highest point of the past six months with total shipments of anthracite, bituminous and coke of 1,145,757 tons, a summary prepared by the Coal Section of the Mineral Division of the Commerce Department disclosed.

By far the major portion of this export was to Canada, the Dominion taking 1,090,759 of the total exported.

At the same time during the month the United States imported 34,950 tons of bituminous, anthracite, coke and slack and culm. Most interesting part of this figure is that of the total imported, 22,114 tons were anthracite, and of this amount 19,293 tons came from Russia. Great Britain and Canada were the other important exporters, Great Britain shipping nearly 3,000 tons of anthracite and 3,500 tons of coke; Canada, 5,700 tons of bituminous. Germany also sold us 1,100 tons of coke.

—The United States News

Labor Disputes Set Record for Nation. Twenty Regional Districts Report Strike Activities to the National Labor Board

A summary of the past six months' figures for this year reveals that total coal exports from the United States are up 37 percent over the six-month period in 1933, a satisfactory situation for domestic coal producers.

Soviet exports of coal continue to increase, the Commerce Department monthly coal report, previously referred to in this bulletin, shows. May exports were 88,000 tons of bituminous, all for Mediterranean ports; 40,865 of anthracite, of which the United States took nearly half and Belgium one-fourth, the remainder going to France and Italy.

Price of run-of-the-mine coal supplied by the Panama Canal to transiting or visiting ships was up $1 a ton, effective in May. Nut and slack coal is to be furnished after that date at the present prices until exhausted; this class is not to be restocked. The price increase, according to the commercial attaché, was due to the additional cost in the States and the transportation cost.

THE INDIANA Subdivisional Code Authority of Division No. II, the Illinois Subdivisional Code Authority of Division No. II, the Northern West Virginia Panhandle Subdivisional Code Authority of Division No. I, the Michigan Subdivisional Code Authority of Division No. I, the Code Authority of Division No. III, all of the Bituminous Coal Industry, have applied respectively to the National Recovery Administration for approval of their budgets and the basis of contribution to the same by the members of the industry toward the expense of administering the code.

The budget of the Indiana Subdivisional Code Authority of Division No. II for the period from November 1, 1933, to October 31, 1934, both inclusive, is $64,087.23. The basis of contribution is as follows:

Three mills per ton on the total tonnage produced each month, starting with November, 1933. The statement is made that to provide for the period from June 1, 1934, to October 31, the assessment will be 7 mills per ton on 5,500,000 tons, to raise the estimated expenditures totaling $37,713.25. The amount of shipping mines to be assessed is 85; the number of truck and wagon mines to be assessed is 430; the number of employes as of January 31, 1934, was 10,780. The annual tonnage for 1933 was 13,810,511 tons.

The budget of the Illinois Subdivisional Coal Code Authority of Division No. II covers the calendar year of 1934. The total amount for that year is $105,000. The basis of contribution is as follows:

A quarterly assessment of $.0015 per ton on the basis of the 1933 tonnage, which amounted to 38,000,000 tons.

The budget of the Subdivisional Code Authority of the Northern Panhandle of West Virginia of Division No. I covers the period from April 1, 1934, to March 31, 1935, inclusive. The total amount is $25,520. The basis of contribution is as follows:

An assessment of 1 cent per ton per month on the preceding month's tonnage, but the total assessment for the 12 months will not exceed the total amount of the annual budget.

The budget of the Michigan Subdivisional Code Authority of Division No. I covers the period from April 1, 1934, to March 31, 1935, inclusive. The amount is $8,250. The basis of contribution is as follows:

An assessment of 1¼ cents per ton on the total 1933 tonnage, which amounted to 550,000 tons.

The budget of the Divisional Code Authority of Division No. III covers the period from May 1, 1934, to April 30, 1935, inclusive. The total amount of the budget is $44,556. The basis of contribution is as follows:

An assessment against each producer based on the total 1933 tonnage. The total assessments are not to exceed the total of the budget.

Notice is given that any criticisms concerning these budgets or the bases of contribution must be submitted to Deputy Administrator W. P. Ellis, Room 3325, Department of Commerce Building, Washington, D. C., prior to August 1.

THE UNOFFICIAL ECLIPSE

—Washington Evening Star

THE CODE AUTHORITIES of the Eastern Subdivision of Division I, the Western Pennsylvania Subdivision of Division I, the Southern Subdivision No. 1 of Division I, the Southern Subdivision No. 2 of Division I, the Northern West Virginia Subdivision of Division I, the Ohio Subdivision of Division I, the Illinois Subdivision of Division II, the Divisional Coal Code Authority of Division III, the Arkansas-Oklahoma Subdivision of Division IV, the Southwestern Subdivision of Division IV, and the District L, Northern Colorado, Subdivision of Division V, have submitted an application for modification of the Code of Fair Competition for the Bituminous Coal Industry. The proposed amendments follow:

Sec. 2. (a) Each Subdivisional Code Authority shall set up and maintain a Statistical Bureau which shall be under the direction of a Managing Director, who may be the Secretary of the Subdivisional Code Authority and who shall not be an officer, director, or employee of any Producer. All producers shall, in their respective subdivisions, report all spot orders to such Bureau and shall file with such Bureau copies of all contracts for the sale of coal, copies of all invoices, copies of all credit memoranda and such other information concerning the production and sale of coal as such Subdivisional Code Authority, with the approval of its Presidential Member, may require. All such records shall be held by such Bureau as the confidential records of the producer filing such information, until the Subdivisional Code Authority shall direct their return to the producer filing the same. Each Bureau shall, if so directed by the Subdivisional Code Authority, compile from such records in composite form and in such a manner as shall not be prejudicial to the interests of any producer, statistical information with respect to the sale and distribution of coal. None of such records or the information contained therein shall be disclosed to anyone except as so compiled, except as hereinafter provided in connection with the violations of the code. The Managing Director shall examine such records, and if such examination shall, in the opinion of the Managing Director, disclose a violation and the producer concerned shall fail to promptly remedy such violation or abandon the practice resulting in such violation, the Managing Director shall report such violation to the Subdivisional Code Authority, together with any information necessary to enable the Subdivisional Code Authority to consider such violation and to enforce the observance of the code.

(b) The Statistical Bureau shall also collect and compile any reports and any other information required under the National Industrial Recovery Act. All producers subject to the Code shall furnish to any Government agency or agencies designated by the Administrator such statistical information as the Administrator may from time to time deem necessary for the purpose recited in Section 3 (a) of the National Industrial Recovery Act.

(c) In any investigation of any complaint of unfair practices, the Presidential member of a Subdivisional Code Authority, to the extent necessary for the determination of the validity of any such complaint, shall have power to require reports from and shall be given access to inspect the books and records of any producer against whom a complaint shall have been filed.

(d) The expense of administering this code by a Divisional (or Subdivisional) Code Authority shall be borne by those subject to such Code Authority, each paying his proportionate share, as assessed computed on a tonnage basis, in accordance with regulations prescribed by the Code Authority with the approval of the Administrator, and failure to pay

such assessments shall constitute a violation of the Code.

Charles B. Barnes has been appointed chairman of the Bituminous Coal Labor Board, Division 1, North.

Mr. Barnes, who also is chairman of Division 1, South, at Cincinnati, succeeds John M. Carmody, whose resignation was accepted recently. The new appointee is to serve during the pleasure of the Administrator. Mr. Carmody was recently appointed a member of the Railroad National Mediation Board.

An interpretation declaring certain coal-selling methods to be a violation of the Bituminous Coal Code was announced by Division Administrator C. E. Adams, of the NRA.

Jonas Waffle, Terre Haute, Ind., managing director of the Indiana Subdivisional Code Authority, asked for the interpretation. He submitted these facts:

"Many producers and sales agents are guaranteeing analyses and B. T. U. values far beyond the true analysis and B. T. U. content of the coal. In these instances, the penalties assessed reduce the price to the producer or sales agent below the fair minimum Code price."

He asked the Administrator this question:

"Do sales of coal on a guaranteed analysis basis which result in a penalty and a subsequent price less than the fair minimum price established by the Code Authority constitute a violation of the code?"

Division Administrator Adams replied with the following interpretation:

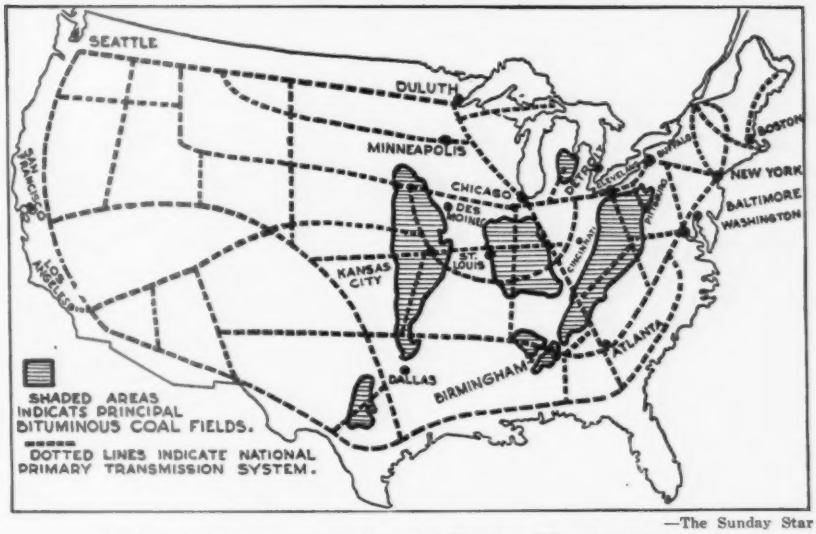
"Sales of coal made in that manner and having the result indicated would be a violation of the code."

ALABAMA'S COAL industry cannot meet competition from tax-free, Government-subsidized plants which are selling power below actual production and distribution cost, says a report given out by a committee of Alabama coal operators which has completed an inquiry into the effects of Tennessee Valley Authority competition on Alabama's largest pay-roll industry.

Completion of the present TVA program will destroy the market for 3,250,000 tons of coal and throw out of employment 7,000 miners, is a conclusion in the report, based on the statement that "the present progress of the TVA, involving the erection of four additional dams other than Wilson, Wheeler, and Norris, according to Chairman Morgan of TVA, will produce roughly 750,000 kilowatt hours of prime power. That is roughly 1,000,000 horsepower.

"In his testimony before the Subcommittee on Appropriations of the House, Dr. Morgan estimated that after Wheeler Dam is completed it will take 35 men to operate it, and at Wilson Dam about 25."

The report shows the competition that has been going on against coal since 1928, coal production falling from around 21,000,000 tons in 1921 in Alabama to 8,914,000 tons in 1933, with the number of men employed reduced by 10,000, or 35 percent, and number of days worked per year by 48 percent.



—The Sunday Star

When U. S. Is Spanned by High-Tension Electrical Network

Alabama coal and ice producers recently instituted suit in the Federal Court to enjoin the Federal Government from competing through TVA with the coal and ice business.—*Wall Street Journal.*

SHIPMENTS OF ANTHRACITE for the month of July, 1934, as reported to the Anthracite Institute, amounted to 2,973,978 net tons. This is a decrease, as compared with shipments during the preceding month of June, of 521,245 net tons, or 14.91 percent, and when compared with July, 1933, shows a decrease of 264,930 net tons, or 8.18 percent.

PRODUCTION OF both anthracite and bituminous coal in Pennsylvania in June showed losses as compared with May of this year, but increases as compared with this period a year ago.

Preliminary figures of the State Department of Mines show that the anthracite production in June was 4,184,000 net tons. This is 20 percent less than May's production. In June, 1933, the production figure was 3,928,000 net tons.

Secretary of Mines Walter H. Glasgow has reported that 180 collieries, or 80 percent of the 225 mines available for operation, worked either full or part time during June. Production for the first six months of 1934 was 50 percent greater than during the same period last year.

The department reports show that 11 fatalities occurred in the anthracite mines in June, compared with 26 in May and 13 in June, 1933. Seventeen of the 25 inspection districts were operated without a fatality. The average production per fatality last month, according to Secretary Glasgow, was 380,000 net tons. Of the 11 fatalities in June, 7 resulted from falls of coal and rock; 2 from mine cars and motors; 1 from blasts, and 1 from falling timber.

The production of bituminous coal last month was approximately 7,153,000 net tons and showed a loss of 3.7 percent as compared with the May production of 7,383,000 tons. Production of more than 47,000,000 net tons during the first six months of 1934 is the best record established since 1931 and 31 percent above the production for the first half-year of 1933.

Eighteen of the 26 inspection districts in the bituminous mining regions operated without a fatal accident in June, this year. In the remaining eight districts a total of nine fatalities occurred, as compared with 16 for the month of May and 9 for June, 1933. Five of the nine fatalities last month resulted from falls of coal, rock, and other material; two from motors and mine cars; and two from miscellaneous causes. The average production per inside fatality, based on the June estimated output, was 795,000 net tons.

THE TOTAL PRODUCTION of anthracite (which includes colliery fuel) for the week ending August 4, as estimated by the United States Bureau of Mines, Department of the Interior, Washington, D. C., amounted to 883,000 net tons. This is an increase, as compared with production of the preceding week, of 55,000 net tons, or 6.6 percent. Production during the corresponding week of 1933 amounted to 884,000 tons.

The total production of bituminous coal as estimated by the U. S. Bureau of Mines, Washington, D. C., for the week ending August 4, amounted to 5,815,000 net tons. Compared with production of preceding week, this is a decrease of 205,000 net tons, or 3.4 percent. Production during the corresponding week in 1933 amounted to 6,770,000 net tons.

The total production of soft coal during the current calendar year to August 4 is estimated at 211,411,000 net tons, as compared with 180,092,000 tons during the corresponding period in the preceding year, showing an increase of 31,319,000 tons.

The Committee apparently realized that the industries were aware that the hearings held were little more than per-

functory observance of the legal formalities. Its spokesman explained that the Cuban hearings had been delayed because negotiations were practically completed before even the Reciprocal Tariff Act had been passed by the Congress.

Whether the new ruling will allow complete public hearings; i. e., the presence of representatives of any interested industry whether they have a statement to make or not, is not known. Nor has the committee indicated whether it will relax on its ruling that legal counsel is barred from making the protest for the industry affected.

But the ruling is apparently a relaxation of the earlier stand and may be indicative of a new feeling to make tariff agreements which will not "be rammed down the country's throat."

The flood of criticism that has met the early tariff bargaining already done is indicative to the administration that care must be exercised in the entire procedure. It is likely that with the return of the President, changes that will bring about a more open policy in the entire matter may be made.

Meanwhile it is understood that preliminary negotiations have been opened with Brazil and Argentina and that as soon as the Soviet debt question is settled they will also be involved in trade negotiations.

THE NATIONAL RECOVERY ADMINISTRATION has issued an order recognizing the following as members of the Code Authority for the manganese industry:

Members of the executive committee of the American Manganese Producers Association; J. Carson Adkerson, National Press Building, Washington, D. C.; H. A. Pumpelly, Domestic Manganese and Development Company, Oswego, N. Y.; James W. Gerard, 57 Williams Street, New York City; A. J. Seligman, Butte Copper and Zinc Company, 42 Broadway, New York City; D. H. McCloskey, 501 Fifth Avenue, New York City; and these nonmembers of the executive committee: W. B. Daly, Anaconda Copper Mining Company, Butte, Mont.; John H. Cole, Domestic Manganese and Development Company, Butte, Mont.; L. L. Savage, U and S Mining and Development Company, 501 Fifth Avenue, New York City; and John Rickey, Moorlight Mining Company, Philipsburg, Mont.

THE FIRST National Metal Congress and Exposition ever held in New York City will be the greatest since the one in Cleveland in 1929, according to the statement from W. H. Eisenman, secretary of the American Society for Metals and director of the Exposition.

October 1 to 5, 1934, is the date. The exposition will be held in the Port Authority Building at Fourteenth St. and Eighth Avenue, and the sessions of the Congress will be held there and in Hotels Pennsylvania and New Yorker.

Already the show itself is 30 percent larger than last year, and the technical programs of the five societies cooperating in the National Metal Congress are even larger and more varied in scope than usual.

Members of the American Society for Metals, the Institute of Metals and Iron and Steel Division of the A. I. M. E. and the Iron and Steel Division of the A. S. M. E. will have headquarters at Hotel Pennsylvania. The New Yorker will be the meeting place of the American Welding Society and the Wire Association.

TO SUPPLY the mineral industry promptly with data on platinum and allied metals production and markets during the past year, the following information is furnished by the United States Bureau of Mines:

CRUDE PLATINUM

Production.—Mine returns for 1933 indicate a production of 793 troy ounces of crude platinum in Alaska*, 417 ounces in California, and 56 ounces in Oregon, a total of 1,266 ounces (1,074 ounces in 1932). The greater part of the production in Alaska was from placers in the Goodnews Bay district south of the mouth of the Kuskokwim River. In California most of the platinum produced was a by-product of dredges working the gold placers in Merced and Sacramento Counties. Virtually all the production in Oregon was from the ocean beach near Cape Blanco, in Curry County.

Purchases.—Platinum refiners in the United States reported purchases of domestic crude platinum from the following sources in 1933: Alaska 145 ounces, California 297 ounces, and Oregon 66 ounces—a total of 508 ounces (481 ounces in 1932). Refiners in the United States also reported purchases of 58,897 ounces (19,043 ounces in 1932) of foreign crude platinum in 1933—12 ounces from Canada, 54,784 ounces from Colombia, and 4,101 ounces from South Africa.

Minerals Yearbook Chapter on Platinum.—Complete statistics and information on the production of platinum in 1933 are given in the chapter on "Platinum and Allied Metals" in "Minerals Yearbook 1934" about to be issued by the Bureau of Mines, and which may be purchased about August 20 from the Superintendent of Documents, Government Printing Office, Washington, D. C.

REFINED PLATINUM METALS

New Metals Recovered.—Reports from refiners of crude platinum, gold bullion, and copper indicate that 51,539 ounces of platinum metals were recovered in the United States from these sources in 1933, an increase of 193 percent compared with 1932.

FOREIGN TRADE

Imports.—The imports into the United States of platinum metals increased from 56,047 ounces in 1932 to 162,081 ounces in 1933. The imports of platinum from the United Kingdom increased from 14,555 ounces in 1932 to 63,065 ounces in 1933 and the imports from Russia increased from 76 ounces in 1932 to 21,945 ounces in 1933. The imports from Colombia decreased from 16,380 ounces in 1932 to 15,608 ounces in 1933. Palladium imports, virtually all from the United Kingdom, increased from 15,445 ounces in 1932 to 37,790 ounces in 1933.

Exports.—The export trade in unmanufactured platinum again increased, but there was a decrease in platinum manufactures in 1933 compared with 1932. Unmanufactured products increased from 20,106 ounces in 1932 to 23,686 ounces in 1933. Japan (7,765 ounces) and Germany (6,936 ounces) were the chief purchasers of unmanufactured platinum, while the United Kingdom (3,825 ounces) and France (3,524 ounces) also took important quantities. The exports of platinum manufactures decreased from 2,032 ounces in 1932 to 1,323 ounces in 1933. The United Kingdom again was the main purchaser of manufactured platinum.

* Reported by U. S. Geological Survey.

THE GAUNTLET

—The Birmingham Age-Herald

CONGRESS passed a bill in its recent hectic session providing for the membership of the United States in the International Labor Council but allocated no necessary funds. It is the general Washington belief that if the A. F. of L. convention approves the membership, the State Department will provide the needed funds without fuss.

THE PRESIDENT has announced that Secretary Hull will be in charge of negotiating reciprocity pacts under the tariff-bargaining act.

Expansion of Centralized Milling and of Tailing Retreatment Operations in Tri-State District

(*Continued from page* 36)

to determine the amount of this soluble zinc, erroneously high values may be shown. This film of oxide also causes some trouble in floating the zinc mineral and necessitates a longer period of agitation with chemicals before its being fed into the flotation machine. The feed to the flotation machines in most mills will all pass 65 mesh, although in a few cases the maximum size is minus 35 mesh.

At one mill very coarse flotation is practiced. Here the feed to one battery of cells is minus 1½ mm. The tails from these cells are recleaned over tables and the concentrates from the two units mixed. It was found that by this method the grade of the mixed concentrates could be raised over that made by tables alone. The grade of the table concentrates runs about 58 percent metallic zinc and of the flotation concentrates about 63 percent. As more than half of the concentrates ordinarily are produced from the flotation unit, the grade of the combined concentrates runs above base, which is 60 percent metallic zinc. This practice of coarse flotation has not been more generally adopted because many of the operators are not convinced that the resultant product has been produced more economically than if all had been made on tables.

Statistics

In 1929, 61,607 tons of zinc concentrates, or 9.7 percent of the production of the district, were produced by tailings mills. An average of 20 mills operated during the year, with the maximum of 27 in the middle of the year. In 1930, about the same number of mills were operating, but they produced 67,939 tons of zinc concentrates or 14.9 percent of the total. The following two years saw a gradual reduction in the number of such mills operating, to 12 in 1931 and three in 1932. The tailings mills accounted for 15.3 percent of the zinc production in 1931, but only 9 percent in 1932. The year 1933 saw two mills operating at the beginning of the year and 16 by the close of the year, the average for the year being eight. These mills produced 24,251 tons of zinc concentrates or 10.8 percent of the total. This year, 1934, has seen a rather rapid expansion in the number and size of tailings mills. At present there are about 20 mills operating and during June these mills produced 6,710 tons of zinc concentrates or 22.5 percent of the total. For the first seven months of 1934 tailings mills have accounted for 35,102 tons of zinc concentrates or 20.8 percent of the total.

This rapid expansion of the production from tailings mills has been accounted for largely by the fact that there are now six central tailings mills in operation which handle from 60 to 70 tons of heads per hour, operating 24 hours per day. Each of these mills makes from 100 to 150 tons of zinc concentrates per week, which is comparable to the production of many mills handling crude ore.

It is thought that this year will see the peak in the retreatment of tailings and that in subsequent years there will be a rather rapid decline in the production of concentrates from this source. The number of tailings piles that can be retreated economically is dwindling fast, for with the large capacity of these central mills combined with the large number of mills operating on single piles, the available tailings piles are rapidly being depleted. The tailings piles that have been created in the last 10 years have been practically all from plants having flotation, and the values remaining are too small to retreat economically unless some new process is brought to light that will change the economics of the present picture.

The Wheels of Government

(*Continued from page* 44)

Joseph P. Kennedy explained that the answers required by the questionnaires for the proper filing of applications for registration or exemption would be the later basis for definite regulations. He said:

"Under the law, we can't change methods of bookkeeping, but we can ask so many questions that it will result in change in some of the accounting methods.

"We have got to get as much information as we can, so we can work out a permanent policy. We've got to get started, and we want to know all we can about the stock exchanges. I don't think we've missed many points."

The facts asked of stock exchanges in the questionnaires concern membership, trading, commission rates, margins, loans of members, short sale, manner of solicitation of business, number of transactions and many other minute details. Issuers of registered securities will have 30 days after the announcement of new rules and regulations during which they may withdraw their registrations and not be bound by the rules and regulations. In some special classes of stock, such as those of corporations in bankruptcy or receivership, it may be certified, as in the case of foreign bonds, that "special circumstances" warrant temporary registration, but the exchange and not the issuer must make the application, and the Commission must decide the question.

This provision, authorizing action by the exchange, is primarily intended for protection of investors in such securities, the market for which might be seriously affected unless registration facilities were afforded.

Two questions, which ask if the exchange expects to comply with Title I of the Securities Act, are contained in paragraphs 10 and 25 of the statement which an exchange must file in connection with application for registration or exemption. One of these declares that willful violation of the title's provisions means improper conduct; the other asks if the exchange will enforce compliance of the title even to exchange members. Affirmative replies to these questions, in effect, commit the exchanges to advance rulings by the Commission, in the opinion of officials here.

Rules for over-the-counter transactions will come later. There is the matter of simplifying the intricate questionnaires formerly sent out by the Federal Trade Commission's securities division.

Mr. Kennedy went on to say: "In a large measure we would have the exchanges do their own policing. They are in a much better shape to do this than to have the Government send in a staff. We are going to find out by these questionnaires what they have in the way of rules, and thus determine our future course. It would be advisable to have uniform rules, but there are many rules that cannot be uniform for different exchanges."

Concerning the investor, Mr. Kennedy said the Commission hoped to devise some plan the average investor could use in making up his mind concerning stocks.

"We don't tell him what's a good buy; all we do is give information on the details of the stock. We hope to eliminate practices which have caused undue fluctuations, but even by eliminating these manipulative practices you cannot control all the rises and falls of the market. Investors must use their own judgment. There is still a premium on brains and analyzing conditions."

Labor

The new National Labor Relations Board has lost no time in hearing cases. It has disposed of more in one month than its predecessor, Senator Wagner's National Labor Board, did in six. In several, it has censured employers for tactics against unions; ordered reinstatement of employes discharged for refusing to join a company union; ruled that company unions cannot be "exclusive" in a plant; held that a "collective bargaining agreement which provides merely for the closed shop is an oddity in annals of labor relations."

The former practice of allowing time to meet rulings has been abandoned, and now if a decision is not complied with speedily, the case is referred to the NRA legal division for action.

Washington commentators foresee a nation-wide unionism educational movement following the fifty-fourth annual convention of the American Federation of Labor at San Francisco on October 1.

Plans discussed at a recent meeting of the executive council of the Federation showed a need for trained leaders and educated rank and file as the result of the huge "mushroom" growth of trade unionism during the past year. But the same Washington commentators say that the movement will be threatened unless trained leaders step forward to guide the way.

Developing the American Tungsten Industry

(*Continued from page* 28)

the House Ways and Means Committee, which will be found in Bulletin No. 7, dated June 7, 1929, beginning with page 1323. This resulted in the tariff being increased 10 percent in the Hawley-Smoot Tariff Bill.

The present tariff is approximately $7.93 per unit and is not a prohibitive tariff since foreign countries ship into America about 4,000 tons 60 percent annually, the revenue to the Government being approximately $2,000,000. This is almost nothing for all of the consumers of tungsten in the country to pay when the benefits are taken into consideration, but the tungsten operators never have had the full benefit of the tariff. Prior to the enactment of the Hawley-Smoot Tariff Bill, large quantities of tungsten ore were imported by manufacturers and speculators before the bill went into effect. This kept consumers supplied until this year and now the domestic tungsten producers have an opportunity to supply the market, at a reasonable price, providing the demand arises and foreign ores are not imported in large quantities.

At the present time, little is coming in from China or South America and the prices of foreign ores—due to monetary conditions—are higher than they have been for some years.

However, the recent Congress passed the Reciprocal Trade Bill giving the President the power to raise or lower the tariff on certain commodities—tungsten being among them—50 percent. Should the tariff be reduced 50 percent in a reciprocal trade agreement with any of the tungsten producing countries it would unquestionably mean the end of tungsten mining in America. The annual consumption of tungsten is approximately 4,500 to 5,000 tons of 60 percent concentrates and it is argued that America cannot produce this amount and my reply is that they have never been protected in price to justify sufficient development work in order to make this production. There is no question but that American producers can supply the demand if the properties in the various states are properly developed and put on a sound producing basis. However, with continual fluctuating prices—due principally to changes in tariff—no company can feel even reasonably safe in spending large sums of money to develop its mines. Due to various laws which have been passed recently by Congress the supplies used in the production of tungsten have increased materially and this should be offset by an increase in the tariff rather than a decrease.

Tungsten should be protected sufficiently to keep the American mines open. At present they are being mined at depth and unless the operators can get a price high enough to warrant continued operations, and systematic development of ore reserves, the mines will be allowed to fill with water and cave in, causing the loss of many millions of dollars and throwing out of employment a large number of men. Tungsten operators would today be increasing employment if they were certain the tariff would not be lowered. If the mines are allowed to fill with water, it will—in my judgment—take at least a year—at enormous expense—before they could again be put on a producing basis, regardless of the price consumers may be willing to pay for ore.

The foreigner will soon learn that American mines are closed down and he will charge all the traffic will bear for his ores since he will have no domestic competition.

In the event of a war—and I hope we never have another—America could be cut off from foreign supplies of tungsten, and, if our own mines were closed down, it would be a sorry mess.

I challenge any economists to prove that tungsten is not the key mineral of all minerals in connection with manufacturing in this country and the Government should further protect the industry and keep it alive. The annual consumption—in normal times—is approximately 4,500 to 5,000 tons of 60 percent concentrates. Perhaps 600 tons of this is used in the chemical, light and other industries. The balance is used in high speed tool steel of various kinds and America can and will supply her own needs if protected and given a price of approximately $16 to $18 per unit.

The extra cost to the final consumer would be almost nil. If high-speed tool steel normally sold for 60 cents per pound and was raised 5 cents a pound—in order to protect the tungsten industry—I doubt if anyone could figure the small actual extra cost to the final consumer taking into consideration the work one pound of high-speed tool steel will do. The same applies to tungsten used in the chemical, electric light, X-ray and other industries.

In conclusion, I want to point out that the tungsten business in this country was started as a necessity, and has done more to help produce cheaper products of all kinds in this country than any other mineral or metal.

I have not given the figures on domestic production nor on imports since these can be obtained from the Bureau of Mines in Washington, who have a complete accurate record covering 25 years.

Some day the Government will realize that tungsten really is a rare mineral and it should own all the domestic tungsten mines for future protection.

Potash—Past, Present and Future

(*Continued from page* 26)

not likely to fail to establish one that will be effective.

Foreign competition remains another problem of the domestic producer. Potash is on the free list. The German-French Syndicate has been selling here for years and has done valuable educational work in promoting the use of potash. It now supplies approximately one-half the domestic potash market. During the past year Spanish producers and the Soviet Government have entered the market with considerable tonnage of crude and refined potash salts. There was not room for all these foreign and domestic producers, and in June the price broke sharply. It seems impossible to obtain adherence to a code because the foreigner cannot be controlled. Nevertheless the American producer is entitled to reasonable protection. He pays as high as $5.85 per mine shift, as compared with $1.05 in Spain, $1.33 in France, about $2 in Germany and little but room, meals and clothes in Russia.

An embargo under Section 3(e) of the National Industrial Recovery Act seems necessary, and the most feasible way of affording protection to the American producer and his employes.

A glance at potash in America—past, present and future—shows almost complete dependence on Germany from about the time of the Civil War, when the potash mines of that country were opened, to the World War, when this country was cut off from its supply of this mineral so highly important in the manufacture of fertilizers, munitions, and other industrial chemicals. During the war potash was obtained, but at tremendous expense. Since then, chiefly through the Government's policy of development of its New Mexico natural potash deposits, we have become completely independent of foreign monopolies. Looking to the future, we must develop new uses for potash, and encourage greater use of this plant food in agriculture, and we must make certain the protection of the American industry from destruction at the hands of the foreign producers, all of whom demand so much of the domestic market that little is left for the American miners and refiners.

THE DEPARTMENT of Geology and Mineralogy of the School of Mines and Metallurgy of the University of Missouri has been the recipient of a large collection of rocks and minerals, comprising the personal collection of Mr. Harry G. Davis, of Clayton, Mo. This collection was obtained through the efforts of one of the recent alumni, Mr. Albert E. Pessin (1932) and Dr. O. R. Grawe. The collection is made up of nearly 1,000 specimens of rocks, minerals and ores from many of the important mining localities of the world, and includes a number of rare minerals. The total value of the collection is conservatively estimated at $300, much of it having been purchased by Mr. Davis and the rest collected by him on trips to various mining districts. Mr. Davis has been financially interested in a large number of mining companies and in this way became deeply interested in minerals, their mode of occurrence, significance and economic value.

PERSONALS

Dr. E. H. Wells, New Mexico School of Mines, will have special charge of the data to be presented by New Mexico, to the Western Division meeting, The American Mining Congress.

Among the speakers announced on the preliminary program for its western meeting, by The American Mining Congress are: **W. S. Boyd,** vice president, Utah Copper Company, and Nevada Consolidated Copper Corporation; **W. Mont Ferry,** vice president and general manager, Silver King Coalition Mines Co.; **Hon. Key Pittman,** Senator from Nevada; **Charles H. Segerstrom,** President, Nevada-Massachusetts Co.; and **Howard I. Young,** American Zinc, Lead and Smelting Company.

H. DeWitt Smith, Newmont Mining Corporation, has purchased an interest in Foley-O'Brien, Ltd., whose properties are located in Ontario, Canada.

Dr. George Otis Smith, well known Government official for the past 30 years, having served as Director, U. S. Geological Survey, and on the Federal Power Commission, has transferred his headquarters from Washington to Skowhegan, Me.

Otto Sussman, president, The American Metals Company, Ltd., is in Africa. He plans extensive travel throughout Egypt, Sudan, East Africa, and Northern Rhodesia before his return to this country in November.

H. C. Parmelee, editor, *Engineering & Mining Journal,* spent the month of August in the Canadian wilds, accompanying a group of Princeton students and professors in the Summer School of Geology and Natural Resources.

Philip D. Wilson, Pardner Mines Corp., has moved his office to the Chrysler Building, New York City.

"B" mine of the Union Pacific Coal Company, Superior, Wyo., and the Stillwater Mine of the Hudson Coal Company, Candling, Pa., have been awarded the "Sentinels of Safety" trophy, awarded by the Hercules Powder Company, for the best bituminous and anthracite safety record in 1933.

H. B. Baird, formerly vice president and sales manager, Berwind White Coal Mining Co., has been elected vice president, Koppers Coal & Transportation Co., Koppers Coal Company, and Castner, Curran & Bullitt, Inc. He will make his headquarters at Pittsburgh.

John M. Carmody has been appointed a member of the National Railway Mediation Board.

Frank H. Crockard, formerly president, Woodward Iron Company, has been appointed deputy administrator, Division 4, NRA. He will handle codes for the wholesale trade.

John Wellington Finch has been appointed director, the United States Bureau of Mines. **Scott Turner,** former director, returns to private practice.

R. J. Oldham, general superintendent, Centralia Coal Company, has been appointed general manager of the company, which is located at Centralia, Ill.

D. A. Callahan, president, Callahan Zinc-Lead Company, is spending some time in New York in connection with affairs of his company.

J. F. Callbreath, secretary, The American Mining Congress, left early in September for a tour of the western mining districts, preliminary to the annual meeting of the Western Division of the organization.

J. B. Putnam, Pickands Mather & Company, Cleveland, Ohio, is in Europe on a vacation trip, returning to this country the latter part of September.

Howard N. Eavenson, president, American Institute of Mining Engineers, plans a trip throughout the West meeting with various chapters of the Institute.

Eugene McAuliffe, president, Union Pacific Coal Company, was in the East in August, where he conferred with officials of The American Mining Congress, and the American Institute of Mining Engineers, of whose Boards of Directors he is a member. Mr. McAuliffe also conferred with various mining men in the East in relation to the work of the Special Committee for the Rehabilitation of the United States Bureau of Mines, of which he is national chairman.

R. C. Allen, vice president, Oglebay, Norton and Co., Cleveland, Ohio, will be the special representative of the iron ore producers to the annual meeting of the Western Division, The American Mining Congress, at San Francisco, the last week in September.

Erle V. Daveler, Utah Copper Company, has returned to New York after a western trip.

Howard I. Young, president, American Zinc, Lead and Smelting Company, and president, The American Mining Congress, with Mrs. Young, will attend the Western Division meeting of the latter organization. Mr. Young will also inspect properties of his company located in the West.

Dr. L. E. Young, vice president, Pittsburgh Coal Company, and Mrs. Young, sailed for Europe the middle of August, where he will visit the various coal fields.

Lucien Eaton, who has been in Australia for several months, is expected to return to this country early in October.

K. A. Spencer, Pittsburg and Midway Coal Company, Pittsburg, Kans., has been elected president, Southwestern Interstate Coal Operators Association.

A. W. Dickinson, of The American Mining Congress, spent part of August in the anthracite coal fields, and left early in September for a western trip which will culminate at San Francisco, at the annual meeting of the western group of his organization.

C. P. Daniels, Enterprise Wheel & Car Mfg. Company, was a Washington visitor during the month of August.

Dr. E. W. Parker, Anthracite Institute, Primos, Pa., was in Washington in August.

W. J. Robinson, Robinson Ventilating Company, was in Washington early in August.

J. Milton Duff, Phillips Mine & Mill Supply Company, attended the meeting of the Mine Car Manufacturers, held in Washington, the middle of August. These manufacturers are attempting to develop a code under the NRA.

Walter E. Trent, Trent Processing Corp., New York City, was a Washington visitor August 8.

Carl J. Trauerman, president, Montana Mining Association, Butte, Mont., has been in the East on business, and conferred with Washington officials on August 7.

Arthur Roeder, former president and receiver for the Colorado Fuel and Iron Company, has been named temporary trustee by the Federal District Court on petition of the company under the new bankruptcy law.

Erskine Ramsay, chairman of the Board of the Alabama By-Products Corporation, sailed from New York August 4, with a party of newspaper men, for Italy where he will be the guest of the Italian Government, and will be received by Premier Mussolini.

LeRoy Salsich, president, Oliver Iron Mining Company, Duluth, has been in the East. He attended the meeting on the iron ore industry code in Washington, August 6.

Frank Purnell, president, Youngstown Sheet & Tube Company, has been elected chairman of a "sound money" committee to aid in the election of sound money Congressmen and Senators. The committee will urge a fixed value for the dollar, reduction of the Federal budget, and reduction in Federal expenditures.

A. W. Allen, for several years editor of the *Engineering & Mining Journal,* is now a consulting metallurgist located at Placerville, Calif.

J. E. Archer, a graduate in chemistry from Michigan State College, has been added to the staff of Battelle Memorial Institute of Industrial and Scientific Research, Columbus. His assignment is electro-deposition problems, such as bearing alloys. Prior to his present position Mr. Archer was four years associated with Prof. Colin G. Fink in Columbia University.

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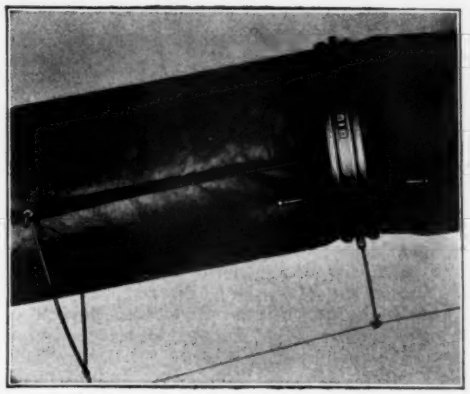

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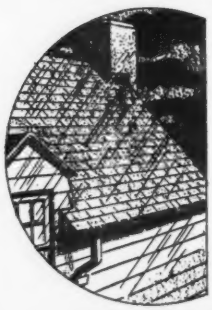

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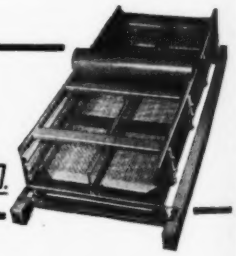

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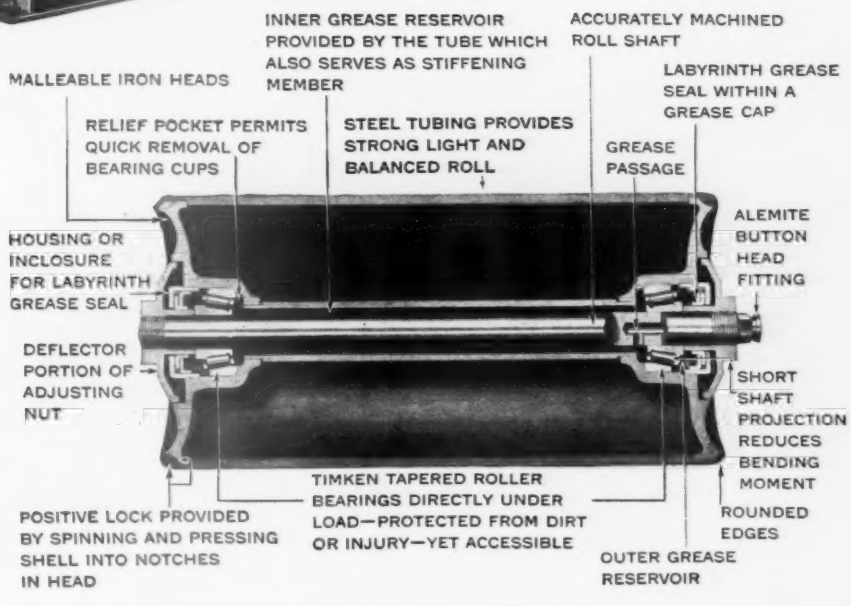
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